

## **STUDY OF WINDOW FACADES AT THE V.A. MEDICAL CENTER - WACO TEXAS**

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The substantial rehabilitation of buildings at the VA Medical Center in Waco, Texas, includes treatment of the original windows. In order to make decisions on the type and level of repair and/or replacement required, a study of several areas is required. These areas include 1) historical significance of the complex and windows 2) functional requirements for the windows 3) a review of comparable projects 4) identification and ranking of options meeting the requirements and 5) a comparison of the options.

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## **FOREWORD**

This report was developed for the Facility Systems Division, U.S. Army Construction Engineering Research Laboratory (USA-CERL). Funding was provided by the Construction Office of the U.S. Department of Veterans Affairs, Washington, DC.

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## I. INTRODUCTION

"Possibly no single piece of equipment has been given so much attention by mental hospital authorities as has the window. The problem has not yet been solved in an entirely satisfactory manner."

### Hospitals 1936

The Department of Veterans Affairs operates approximately 172 medical centers nationwide. Its primary mission is the delivery of health care services to American Veterans. In the performance of its mission the VA must design, construct, operate and rehabilitate large facilities across the United States. The facilities management aspect of the VA program is in support of its primary mission, but must respond to numerous, often conflicting, requirements and standards. This planning study is a detailed examination of one aspect of the VA's construction and facility management program, the repair and/or replacement of windows in historic or potentially historic hospitals, using the VA Medical Center in Waco, Texas as the study model. The study has been performed as part of a Memorandum of Agreement (MOA) between the Department of Veterans' Affairs, the Advisory Council on Historic Preservation and the Texas Historical Commission, and attached as Appendix A. It is one element of an overall preservation plan to be developed for the facility as a part of the MOA.

The solution to the window rehabilitation needs at the VA Medical Center in Waco is in some ways simple but in other ways, extremely complex. A number of parties have participated in the search for a response which satisfies the technical requirements for this site. These parties include the VA staff at WACO and Headquarters, the Texas Historical Commission; the Advisory Council on Historic Preservation; the Architectural firm of Phelps, Garza and Bomberger and numerous private firms and contractors. All are to be commended for contributing specialized knowledge and expertise in an attempt to insure that the VA Medical Center ultimately receives the best possible architectural solution to the window rehabilitation needs.

The VA is to be especially commended in this regard. A review of the correspondence and project files reveals that the VA has gone to great lengths over several years time to seek a proper course of action in their view. Every suggestion or recommendation made to the VA has been explored through the architectural and engineering contract, up through the support of this comprehensive research study to determine the full range of options. In our judgement the VA is seeking what we refer to as the "once and for all" answer. Having been confronted with a wide array of confusing and sometimes conflicting options, the VA would like to have a in-depth, objective look at the issues, resulting in a reasonable set of options meeting the multiple requirements satisfactorily. It is expected that such a study would resolve the issue "once and for all. . ."

The Texas Historical Commission and the Advisory Council are also to be commended for the time and effort they have invested in seeking a solution. These agencies have no desire to obstruct the programs of any organization, but are required to review actions which may impact the architectural or historical integrity and appearance of important sites. They are to be commended for the appropriate recognition of the architectural importance of the VA Medical Center at Waco. It is one of a relatively small number (35) of medical complexes, which, at the time of their construction beginning in the early 1920s set the standard for delivery of health care services of that type for decades. To some degree it influenced other federal, state, local and private hospital planning and design. The VA also is also justifiably proud of this contribution, which dates from the time of it's founding as the Veteran's Bureau.

In summary, everyone interviewed as a part of this study is working toward the same result, i.e. a first class medical center which is functionally appropriate to its changing mission, efficient to rehabilitate and maintain, and reflective of it's proud tradition. It is hoped that the results of this study help clarify the issues, put the requirements in perspective and contribute effective solutions to the VA planning effort.

## II. BACKGROUND AND OBJECTIVES

The VA Medical Center construction at Waco was begun in 1931, as one of an "Architectural Set" of hospitals intended to eliminate the common problems of the day for safe, permanent, sanitary, fire-proof hospitals. Over the years its mission has been shifting away from the original neuropsychiatric (NP) focus, to more requirements for acute care as well as intermediate and long term care. This is a necessary response to the changing character of its constituency, i.e. to the increasing numbers of aging veterans, requiring intermediate and long term nursing care. The VA Medical Center at Waco has responded admirably to this natural evolution and has a program to systematically upgrade and modify its buildings over several years to better serve patient needs.

Some buildings have already been modified under this program, others are currently undergoing rehabilitation, and most are scheduled for future action. Work under this program involves both interior and exterior work activities, in most cases involving the closing of the building, a complete demolition of the interior; replacement of all systems and finishes; and repair/replacement of the windows. It is important that the planning and decision making process for rehabilitation of the windows, as well as other components, fit into the planning and budgeting cycles for the Medical Center. As this Medical Center is historic, any of these changes or proposed changes must, by the VA's own standards, comply with the Secretary of the Interior's Standards for Rehabilitation of Historic Buildings. In the A106 review process, the Texas Historical Commission conducted a review of the work/proposed work to determine if it met the "Standards" herein attached to this report as Appendix B.

The Commission, as part of the A106 review described above, determined that the interiors of all these hospital buildings have undergone extensive changes over the years, therefore any original significance has been lost and the VA is free to undertake any modifications necessary to the interiors. It remains therefore, that the exterior appearance of the buildings and the overall campus plan are the primary manifestations of the site's importance. As a result, treatments of the windows and porches have emerged as critical appearance items, which contribute to the original historic appearance. This study has been charged with a full review of the window repair/replacement issue only.

### OBJECTIVES:

This study should accomplish several objectives as part of a systematic effort to identify the problems and establish a set of feasible options. It should:

1. Clearly establish the nature of the significance of the Medical Center and the windows as a part of the buildings.
2. Review the technical and functional requirements.
3. Identify and describe three projects with similar requirements for comparison.
4. Develop a list of resources which can supply appropriate windows, window parts, repair and other related services.
5. Evaluate the condition of the windows at the Medical Center.
6. Recommend or prepare a solution meeting the technical requirements along with three alternatives and compare all the solutions.

Each of these tasks will be addressed in a separate section of the report. In an effort to be fully objective, any conclusions regarding the ongoing work or proposed solutions will be based on published documents and standards, rather than on the professional judgments or opinions of the research staff. This approach will be followed to the maximum extent possible throughout the

report, and especially with regard to the historic and architectural significance issues, which can be subjective.



### III. HISTORICAL AND ARCHITECTURAL SIGNIFICANCE

This section contains a full examination of the significance of the VA Medical Center at Waco as one of the "Architectural Set". The significance of the "set" is further detailed in Appendix B, which also contains the full list of Medical Centers constructed from the set of plans. The objective for this task was to begin with the broad implications of the VA initiative to develop the "Architectural Set" and to work to a specific review of how windows fit into that history. The questions which were addressed, were:

- A. What was the status of VA Medical treatment facilities prior to the development of the "Set"?
- B. What impact did the VA Set have on VA medical facilities?
- C. What impact did the VA Set have on non-VA medical facilities?
- D. What was the extent of "Standardization" in the architectural set?
- E. What is the role of windows in the Architectural Set?

#### A. What was the status of VA Medical facilities pursuant to the development of the architectural set?

The existence of the VA medical facilities closely parallels the existence of the VA. Prior to the creation of the VA (actually Veterans' Bureau), the care of veterans was a patchwork of government/military medical services that frequently had roots in the era immediately following the Civil War, and a large percentage of the building stock was either old or temporary.

1. At least ten National Homes for Disabled Volunteer Soldiers were built between 1866 and 1902 to provide hospitalization and domiciliary care to "honorably discharged soldiers, sailors and marines who served in any war. . . , Indian campaigns, or any of the extra-territorial possessions of the US, foreign countries, . . . or in organized militia or national guard when called in Federal service, provided they have a disability, either of service or non-service origin." While the authorization creating the Bureau of War Risk Insurance (1917) included the provision of treatment for those with service related disabilities, it was discovered that adequate facilities did not exist. The 1921 appropriation for the bureau included \$4.57 million to expand and modernize existing facilities. (Note: 1921 was when the Veteran's Bureau was reorganized as the VA). It appears that these funds were used to upgrade existing Homes, rather than to expand the number of Homes. Approximately \$1.5 million was allocated to the Home at Marion, Ind. to provide a 1,000 bed neuropsychiatric (NP) facility. Most of the remaining funding was used to provide improved facilities for TB patients at three other existing Homes. (Source: Mattison, 1923).

The National Home program appears to have been intended to serve the permanently disabled (both physical and mental disabilities), irrespective of age. These people presumably were those who lacked the financial or family resources for alternative means/modes of care. In this regard, the Homes provided redundant services with various welfare institutions common in the late 19th and early 20th centuries; for example, public insane hospitals, public hospitals, almshouses, etc.

2. Walter Reed General Hospital opened in 1909 with 89 beds. By 1917, capacity had increased to 164 beds, and between June and October of 1918 capacity increased from 1,235 to 2,645 beds. During 1918 and 1919, over 25,000 cases were treated. This rapid and radical expansion was accomplished through use of "temporary frame (and) semi-permanent tile" construction. At the end of WWI, the War Department planned to reduce the size of the hospital to bring it in line with the needs likely to emanate from a "regular" (i.e., peace-time) army. However, prior to this reduction,

the VA "desired to avail itself of the facilities". At this time (presumably around 1921) "normal" bed capacity was 1,500 with the capacity to expand to an additional 2,000 beds in the event of an emergency. (Source: Hutton, 1923)

3. Many Naval Hospitals (both in U.S. naval ports and outside the U.S. where there were naval bases) were built and expanded during WWI. Much of the construction associated with this was temporary/semi-permanent, and with demobilization many facilities were closed or turned over to the Veterans' Bureau. The nature of Naval Hospitals was that it was "feast or famine" in terms of occupancy by naval personnel, depending on how many ships were in port. This sporadic surge in need was compatible with the availability of temporary facilities. (One of the major influences of the Civil War on late 19th century medicine was the realization that mortality rates were lower for injured persons housed in tents and barns than those in permanent hospital buildings. The presumed cause-effect relationship centered on ventilation, but it more likely was related to the relatively more sanitary status of tents and barns than a 19th century hospital.) Thus, there was very limited construction of Naval Hospitals immediately after WWI -- in San Diego in 1922. That facility employed Mission style architecture to "conform to the local style", and utilized fireproof construction. Ventilation in the wards was provided by double hung windows. (source: Dunbar, 1923)

It is not clear where or how the idea adopted by the VA for stylistically compatible hospitals emerged. Apparently, the Navy was doing it at the same time, if not first, but it also is not clear where the idea originated. The Navy apparently was also concerned with fireproof construction in its new buildings, again at about the same time or prior to the VA construction program.

4. Prior to 1919 the U.S. Public Health Service (USPHS) operated a number of small "marine" hospitals with a total bed capacity of 1,500. These hospitals were intended to serve Merchant Marines, members of the Coast Guard, beneficiaries of a limited number of these federal agencies, and sick/disabled immigrants (i.e., those who didn't pass the medical exams at points of entry like Ellis Island). Between 1919 and 1922, the USPHS provided a variety of health care services through its Marine Hospitals to veterans, including hospitalization and care of disable veterans, and out-patient services. In 1919, the USPHS estimated that approximately 30,000 new beds were needed within the next two years to care for veterans. The 1921 Executive Order creating the Veterans' Bureau included the transfer of the 44 facilities (17,500 beds with a census of 13,000 patients at the time of the transfer) operated by the USPHS for the care of veterans. (The USPHS retained control of the 25 facilities serving those outlined above.) (Source: Lavinder, 1923)

It is not clear what kind of facilities were obtained or erected in the three year period the USPHS was involved in the care of veterans, and thus what was transferred to the VA. However, there seems to be a trend of temporary and semi-permanent construction at the time, to accommodate war, and war disability, related medical needs, and the same seems likely here.

5. Other: Veterans also were cared for through "contract" arrangements but there are few details as to what this means. It may be similar to current Federal procedures for veterans in nursing homes as well as other nursing home residents -- a reimbursement procedure with an, at best, tenuous system of checks and inspections to insure personal safety and limit fiscal fraud.

In addition, the Federal Government operated what is officially known as the Government Hospital for the Insane in the District of Columbia. This facility was begun as an asylum in the 1850s, but during the Civil War was divided and part of the facility was appropriated by the Army and Navy for wounded and/or sick soldiers and sailors. The latter came to be known as General and Quarantine Naval Hospital, and the former as St. Elizabeth's. We have no information about the Army's continued use of the medical facility. Residents of DC, U.S. island possessions and members of military organizations could be admitted to the Government Hospital for the Insane by order of a physician licensed in DC, or a commissioned surgeon of the Army, Public Health or Marine Hospital Service. Immediately prior to WWI, this facility was the responsibility of the Department of the Interior. (Source: Hurd, 1916)

Summary: The physical facilities in which veterans were housed immediately following WWI and at the time the Veterans' Bureau was created were probably less than desirable at the time.

However, there is ample evidence that no one was happy with the situation, and that the different organizations involved saw it as an inadequate and short-term response to the aftermath of war and extensive disability. Charles R. Forbes seems to have shrewdly vocalized and politicized a problem situation in the provision of medical care to disabled veterans ("deplorable conditions; wooden shacks; fire hazards") that caretaker institutions were neither unaware of nor insensitive to.

It was in this context that Charles Forbes, the first Director of the newly established Veterans' Bureau, initiated a plan to eliminate the temporary, less than desirable conditions in hospital care. This initiative took the form of the development of a standardized architectural set of plans to provide permanent, sanitary, fireproof hospitals for the VA. In a construction program beginning in the early 1920s and continuing into the 1940s, at least 35 Medical Centers were constructed across the U.S., based on this "Architectural Set". These medical centers retain the same basic site planning and building designs, but vary stylistically by the use of different exterior treatments, depending on prevailing regional architectural styles. The VA Medical Center in Waco is one of this "architectural set". A full list of these medical centers, with the styles and beginning construction dates is included as part of Appendix C. The following sections take a detailed look at the implications of this program.

**B. What impact did the "Architectural Set" have on VA Medical Facilities?**

The first facilities operated as "VA" hospitals were facilities transferred from the U.S. Public Health Service (USPHS) to the Veterans' Bureau. Apparently some USPHS facilities were either put under the control of the Veterans' Bureau before all USPHS facilities caring for veterans were transferred in first April 1922, or the latter was anticipated since the "first Langley bill" (March 1921) included appropriations for modernization/expansion of a number of USPHS hospitals as well as National Homes and other existing facilities. This appropriation also appears to have included some monies for at least one new site at Rutland, Mass.. Most of these facilities appear to have been either TB or neuropsychiatric (NP) facilities, or National Homes (presumably primarily for the elderly and or severely physically disabled). Two of these sites are definitely on the "set" list (Alexandria, La. and Pittsburgh/Aspinwall division), and due to differences in names (the use of Camp title versus city names) new construction at other USPHS sites may be as well. The first Langley appropriations were under the control of the Secretary of the Treasury, presumably because they predate or closely parallel the official reorganization of the War Risk Insurance Bureau into the Veterans' Bureau.

Funds from the second Langley bill were available in May 1922. The "majority" of the construction funded under this bill was for neuropsychiatric hospitals. The five sites listed in the "set" in Appendix B, with 1923 dates were funded through this appropriation. At least four other NP or TB facilities were included in this bill but they aren't listed as "1923" and are not easily identified. Again, this may be a name problem (e.g., one of these four is Camp Cluster, Michigan; there is a facility at Battle Creek with a 1924 date; they may or may not be the same). (Source: Forbes, 1923).

It is clear that there was/is a small group of early VA facilities that predate the "set." However, it is not clear to what extent subsequent construction between the early 1920s and 1940s followed the set. For example, Oteen, outside of Asheville, appears to predate the "set". It is still in operation, and one would expect that its facilities were built or modernized between 1920 and 1940. The "rules" which were followed between 1920 and 1940 are unknown. There is some evidence in a site plan in Starr of "old" and "new" buildings.

**C. What impact did the VA Set have on non-VA Medical facilities?**

There is little on which to base conclusions about the extent to which the "set" lead, followed or ignored what was going on outside the VA with regard to medical and NP facilities. Experience would indicate that this is tied up with the debate and/or power struggle about segregating NP



"asylums" versus integrated general hospitals. The articles from the 1920s suggest the former position, but the site plans of Waco suggest the latter. It's not clear when the transition occurred, and the extent to which it occurred in (a) medical and/or (b) construction (c) theory/policy versus (d) practice. All kinds of permutations are possible; that policy and practice in medicine or construction were divergent at the time of construction or at later points in time; that changes in medical policy or practice changed and the VA had to make do with facilities built for other purposes (e.g., a building built for disturbed patients needed to be used as a general med/surg ward facility).

It's also important to remember that states and other public institutions were, in many cases, living with an existing building stock; there were few cases in which institutions were being built "from scratch", as was the case with the VA Medical Centers. In fact, there are 19th century buildings still in use at many state asylums today.

At the turn of the century, there was some initial experimentation with alternative means for dealing with the, as they were then called, "insane". Prior to that time, the insane, were dealt with in asylums. This term typically referred to large public institutions, the state hospital, although there were some smaller, private asylums still in existence. During the last third of the 19th century, an asylum's site and building stock were characterized by: (a) siting analogous to that advocated in 1923 by the VA (i.e., rural, large acreage sites); (b) rational "village" plans of function - and/or patient groupings in specific buildings (a concept also clearly subscribed to in the VA building program); and (c) relatively small scale buildings (in comparison to the model asylum of the mid 19th century). While buildings were small, the population of a state asylum was often in the thousands. Further, the census of asylums was homogenous to the extent that, while there was some variation in degree and kind, all patients were classified as (or being observed to determine if they were) insane. There were also, however, different types of asylums. Some specialized in chronic cases (cases of long duration thought to have a low probability of recovery, as well as persons with disorders accepted as irreversible (for example, senile elderly). Other, typically separate, asylums were set up for the criminally insane and epileptics. "Mental defectives" (the term used for retarded people) were sometimes, but not always, kept apart from the insane.

At the beginning of the 20th century, there were limited instances of the introduction of new methods and facilities for dealing with the insane -- for example, the "dispensary" (a kind of walk-in clinic that provided outpatient social/welfare services as well as medical care), and perhaps most importantly the introduction of neuropsychiatric research on both potentially curable, as well as interesting even if incurable cases. The asylum continued, but there was a shift in the type of patient who went where. Cases thought to be incurable went to or stayed in the asylum, where "treatment" consisted of custodial care, at best and forced labor to facilitate economic self-sufficiency of the asylum, at worse. In other words, there was an emerging pluralism in conceptualizations about where and how the insane should be dealt with, as a function of a given patient's mental status or classification.

At the end of the 19th century there was an emerging type of pluralism in the overall plan of asylums as well as in the obviously diverse building types in which the insane were treated and/or kept. The state hospital sites were typically a collection of buildings, laid out in accordance with a rational "master plan of a village". These asylums continued adding more of the function-specific types of buildings to their village plans at least until WWI. Pavilion plans, popular in late 19th and early 20th Century hospital design after Johns Hopkins adopted this form around the 1880s, were never widely used in this country for asylums with the exception of a few facilities for the criminally insane whose construction was initiated in the late 1800s/early 1900s. (Some pavilion plans could be readily modified to create a continuous exterior perimeter that linked several buildings, and provided an extra measure of security.) Hospitals, especially those in urban areas, began to abandon the pavilion plan approach and began to capitalize on advances in construction technology to go up rather than out. Hospitals also were, except for pavilion plans, probably always more integrated into the surrounding landscape/urban fabric than was the case for large asylums.



In general, the site plans of the VA "set" appear to subscribe to late 19th century models for state NP hospitals. While there were no well accepted alternatives to this model in the 1920s, there were other options being explored in bricks and mortar, not just as ideas. The use of multiple buildings sited in some apparently rational way was an established approach to the overall plan for NP institutions in the 1920s. More subtly, this approach was used by the states to provide a landscape of custodial care to chronic patients, not as a spatial locus for research or much treatment.

With regard to the interior of NP facilities, model plans advocated private rooms and a limited number of small (N=6 or so) wards in the 1850s and 60s. Large dormitory areas with large day rooms in "cottages" were advocated in the 1880s and moved in the direction of village plan asylums. We have not examined a plan for a NP ward in a turn of the century hospital but suspect it also was based in a large ward principle. A relevant issue here is that beds in wards typically surround the perimeter of the ward room with the head of the bed to the wall, and a window in the space between each bed. By the late 1930s the following was advocated; beds in wards were grouped in small clusters, the clusters divided by low partitions perpendicular to the walls, and the beds placed parallel to the walls. (The latter required a different type of fenestration to avoid placing beds beside windows.) One 1940 article states that this practice was first introduced in the U.S. 25 years earlier, i.e., 1915.

#### D. What was the extent of "Standardization" in the architectural set?

There are likely to be two, unrelated issues that resulted in the standardization of plans. The extent of standardization, in contemporary terms, is discussed below.

First, the second Langley Bill stipulated that not more than 3% of hospital costs (probably this "base" was to be costs directly related to construction, not, for example, initial staffing) could be used for design and construction supervision. "Only by using existing government agencies as much as possible could this be accomplished, so the War and Navy Departments were called upon for such assistance." Arguably, even partial standardization, with some flexibility in final footprint, size, etc., could reduce the design and construction supervision costs. Also, there is reference in one of the articles that alludes to a "learning curve" in building these hospitals. If that is the case, standardization was another route to saving money. (Source: Starr, 1923)

There is a long history dating back to 18th century France of regulation, if not standardization, of virtually everything related to the military and institutional milieus in general, including behavior and spatial organization that permitted the observation and regulation of behavior. The latter can be stretched, as an idea, to encompass the instrumentality of space to control disease and cross-infection, although there are sounder ways to link architecture and disease/public health. This is addressed more specifically in the discussion on windows, below. In other words, "writing" rules would have been both a familiar and institutionally comfortable way for an early 20th century, military-based agency to do business.

Second, medicine, in general, was becoming very scientific in both espoused and actual practices. This is in contrast to only slightly earlier times. There are also some broad hints, but nothing specific, at poor treatment and possible abuse of veterans in the different settings in which they had formerly been treated and/or housed, prior to the establishment of the Veterans' Bureau. With NP patients this would not have been much different than what was occurring in non-veteran facilities with patients with similar disorders.

One manifestation of the increasingly self-conscious scientific nature of medicine was the use of "research" (i.e. compiling of careful case histories, full medical work-ups not just related to the patient's complaint or symptomology, autopsies) and development of standard treatments based on research. Medical practices were becoming empirical and research-based, and there was greater consensus as to what should be done for a given disorder. In the case of what today we'd call psychiatry, these trends were even more pronounced, even self-consciously so, since the treatment and care of the insane had split from medicine in the early 19th century, and since the 1880s

medicine had been attempting to reclaim it. There was a lot of emphasis on classification of disorders, especially with NP patients. This could be the reason for the names of a lot of the different types of facilities in the 11593 Determination of Eligibility, (Appendix C). In many ways, these were not new trends but dated from around 1880, the time of the introduction of German/scientific models of higher education and medicine at Johns Hopkins. They could, however, be carried out with greater positive effect for patients than was the case earlier, in part because medical technologies were more advanced.

The proclivity of the military to rule writing, mapped onto the increasingly scientific mind of medicine suggests that there was at least a high level intention to standardize as much as possible related to the treatment of sick and disabled veterans.

#### Extent of Design Standardization

There were "rules" regarding site selection for NP hospitals, and these "rules", as described in 1923, favor site specialization (e.g. NP, TB, general medical). They also favor selection of sites for NP hospitals in rural but accessible areas, sites with good drainage, and large acreage. These were all the better if the local citizenry would provide the land. These are essentially the same rules that were followed in part from the early 19th Century, and almost identical to those used in the late 19th Century in siting what would become the enormous state hospitals of the 20th Century.

Given an acceptable site, there appears to have been a standard list of types of buildings to have been provided on each site (see the list in Appendix C), and these types of facilities correspond with either a patient's stage in the admission/treatment process and/or health status [infirm (of body as well as mind), chronic (incurable), disturbed (violent), acute (new but thought to be treatable case), parole or re-education (so called normal life in an institution)]. Predictably, there is no standardization of the overall site design. Somewhat unexpectedly, the building footprint for a building of a given type varies in obvious and subtle ways across sites. Compare, for example, the "Main Building" at Waco with those shown in the Starr article (built or planned in the 1920s). Even those shown in the Starr article differ, and it's not just the Main Buildings (used as a receiving ward), but other types of buildings in the set as well (compare Building 7 at Waco which is dated at 1932 and labeled psychiatric, with what is probably its equivalent at Camp Custer, a Disturbed Patients building - p. 438 in Starr).

With regard to basic construction principles, there seems to have been an emphasis placed on fireproof construction. This is mentioned in several articles, including Forbes and Starr. Starr also emphasizes the use of a key control system to control patient movement, alleviate violence and vandalism, etc. (source: Starr, 1923)

There is limited evidence that standardization of the VA "set" doesn't imply the strict replication of plans. The best guess is that the inventory of types of buildings was specified fairly explicitly and "matched" in some rational way with expected patient profiles and current medical/psychiatric practices. Further, it is possible that while general building plans were specified, these might be more on the order of "model" buildings than standardized designs. It is also possible that the variations are the normal site specific deviations from standardized plans. For example, there is a fairly high degree of similarity across the TB buildings in the Starr plan. All are long on one axis and shallow on the other and even in the absence of a north arrow on the drawings it is probable that the long axis runs east/west with patient areas oriented toward the south to get the sun -- heliotherapy was a widely accepted medical precept at the time and there was a corresponding architectural instrumentality for pursuing that practice. There is no clear evidence to indicate that the windows were standardized except in a similar general way. That is use of metal windows might have been part of standard architectural practice for institutional design, or even more specifically part of "model" VA hospitals, including but not limited to NP facilities, but the particular style, brand or model not regulated or mandated.

#### E. What is the role of windows in the Architectural Set?

A 1936 article states "possibly no single piece of equipment has been given so much attention by mental hospital authorities as has the window. The problem has not yet been solved in an entirely satisfactory manner." (von Metzke) While the article does not elaborate on the range of these problems, they likely include health and safety concerns, as well as building costs and maintenance issues not unique to mental hospitals, along with the safety and security concerns that were somewhat unique to such situations.

Windows served at least two, not necessarily related, purposes. They contributed to the health, safety and welfare of patients, and in more setting-specific concerns, to the control of patients, and the personal safety of patients and staff from patient violence.

Health and Safety Windows admit sunlight and air. A popular 19th Century idea was that sunlight and ventilation created healthy interior environments. Sunlight was thought to have aseptic or germicidal properties (resulting in floor to window ratios). Ventilation both swept out germs (resulting in concern for air changes) and diluted germs in the air (resulting in volumetric criteria). All three precepts predate Koch's discovery of germs in 1882 and the subsequent development of the germ theory of disease. They are rooted in variations on the ancient Greek idea of miasma or bad air. These ideas were codified in the New York Tenement Laws (1887 and 1901) and many vestiges of them remain in current codes and standards.

As early as 1926 it was discovered that window glass blocked the type of ultraviolet rays that, in principle, could kill germs, and more recently (1969) it was shown that ultraviolet light capable of killing germs does not reach the earth. Even after the 1926 finding, the size of windows and orientation of buildings were manipulated to achieve the presumed healthful effects of sunlight. Rey proposed post WWI housing in Paris that utilized this idea (1928), Le Corbusier adopted the idea in the Radiant City plan (1933), and a major architectural concept in the design of the landmark Hospital for Chronic Diseases on Welfare Islands, NYC (1937) was centered on orientation and seasonal changes in the angles of the Sun. With time the benefits of sunlight came to be understood as psychological not medical (e.g. the debate about windowless buildings).

Air was thought to become unhealthful in several ways. Not only was disease thought to pollute air, but also expiration was thought to expel unhealthy elements that accumulated in poorly ventilated areas (note that this predates germ theory, so that whatever was expelled was not understood to be airborne contagions). Over time the criteria underpinning ventilation requirements switched to "comfort" (i.e. dispelling body odor before the widespread use of deodorants) and more recently has again returned to questions relating to health (e.g. questions related to "sick buildings" resulting from the noxious and toxic effects of some building materials and office equipment). (Source: Archea and Connell)

In the context of NP institutions, physical health as well as mental status were concerns by the late 19th Century, prior to the VA initiative to develop the Architectural Set for the VA Hospitals. Many of the patients were indigent and/or old, and were (or were assumed to be) incapable of "appropriate" personal hygiene. It was not uncommon for epidemics of then untreatable disease to sweep through an asylum killing many people, or for debilitating contagious diseases (e.g. TB) to spread among the patients. There were efforts to both limit the occurrence of epidemics (through admission examinations and effectively quarantining new admissions for a short period while such examinations were conducted and initial bed rest prescribed), and prevent the exposure of patients to and the spread of disease (through well ventilated buildings and housing of patients of similar physical and mental status together.)

Mechanical ventilation was very new in the 1920s and 30s, and its introduction does not seem to have had much impact on window sizing or the use of operable rather than sealed windows in institutions at the time the "set" was developed. However a 1936 article asserts that "moveable window sashes (except on some porches and terraces) might well be eliminated" to reduce



construction costs and eliminate the possibility of patients shouting from windows to others outside the building. Where existing windows cannot be sealed, special "fly screen" was suggested as a means of protecting the glass and detaining patients.

There are numerous advertisements, primarily from two companies, for operable steel windows for hospitals. The ads appeared in trade journals whose primary readership was assumed to be hospital administrators, and the ads stress the economic as well the aesthetic benefits of these products. In addition metal windows would have been attractive for their fireproof qualities, even though windows alone would have been a small contributor to any fires. The concern for fireproofing may have stemmed from a number of general and NP hospital fires in the early part of the 20th Century in which lives of patients and staff were lost, as well as property damage sustained. See "Hospital Fires are Numerous". Minimally such events would have created a bad public image and possibly, paradoxically, negatively affected funding from public agencies and governing boards. We have no indication of a lawsuit that early over fire deaths, but that has not been the focus of this study.

### Personal Safety and Security

The conceptual "flip side" of what the windows "let in" is the idea of what they kept in. In the case of NP institutions, that is the patients. Controlling patient location had important implications for the personal safety of patients as well as staff. Escape of the violently mentally ill from designated places in the institution, or from the institution as a whole, was a real concern in terms of violence to other patients and staff, or beyond the institution to the general public. There was probably some concern for self-inflicted violence among the mentally ill as a whole. So, in addition to keeping patients within the general confines of the institution, there was also concern with controlling patients location within the hospital. Large metal windows with small panes would offer "normal" looking windows with security value. The importance of security is emphasized by an ad for wire mesh screen, mounted in a steel frame with the by-line of "Remove Prison bars from the mental hospital... Install the Trulock Safety Screen... A Modern Detention Guard." The ad asserts that the screens are an "insect screen and guard combined...provides necessary security...increases light and ventilation...gives windows and porches a normal appearance" In 1928, The Modern Hospital carried an announcement about the construction of the Northport, Long Island Hospital which said "one of the attractive features of the group of buildings is that there are no prison-like" barred windows."

As noted above, the fenestration effectively footprinted the bed layout in the wards, i.e. a bed between each window with the head to the wall; an arrangement that was considered outdated by the 1930s.

### Selection of Windows at the Waco Medical Center

While the specific documentation leading to the choice of the rolled steel, double-hung windows at Waco is not available, it is relatively clear from available historic literature that the windows were selected for very specific reasons, and that those reasons relate to the objectives for the standardization in the "Architectural Set". At the period of construction, they were marketed as a fireproof, sanitary (easily cleaned), permanent, "maintenance free", operable, secure yet attractive window, much as today's aluminum windows are marketed. This is entirely consistent with the qualities commonly cited for steel windows and the intent of the VA in developing the Architectural Set from which the Medical Center at Waco emanated. As a point of reference, a published typical hospital specification from 1927 calls for steel double-hung windows, indicating how well established this choice was for hospital use in that period.

All of these factors are relevant to the current determination of the significance of the original windows to the architecture of the site, in addition to their visual qualities and impact on the design/detailing. All of these factors will be discussed in Section IV, Standards and Technical Requirements.

#### IV. STANDARDS AND TECHNICAL REQUIREMENTS

An overall review of the standards and technical requirements is fundamental to establishing an appropriate solution for the Waco VA. It is commonplace that multiple or competing requirements come into conflict with one another and require compromise to assure that the overall project objectives are met in a satisfactory manner. The planning and design process should include procedures to accommodate this. Historical and architectural significance factors should be considered appropriately in the planning process. Since originality and visual integrity seem to be at the heart of the current A106 concerns, it seems that either 1) the historical, architectural and visual qualities were not given sufficient weight in the selections of present treatments, or 2) it is not feasible to maintain the visual, material qualities required by VA Construction Standard CD-35. To avoid any possibility of the former, it will be recommended in Section VIII, that the VA adopt such a process equivalent to that established by Architectural Graphic Standards, one of the primary reference sources for architects, in its "Architect's Checklist for Rehabilitating Historic Structures". A copy of this checklist is included as Appendix D. The use of this checklist, or an equivalent, would assist in the identification and evaluation of the implications of standards and technical requirements such as those which follow. The benefits of this would extend to all aspects of the rehabilitation of historic buildings, not simply the windows.

The standards and technical requirements for windows which follow are from the VA Construction Standard CD-35, which is included as Appendix E. This standard was provided by the VA and individual requirements are addressed below in the same order as they appear in Standard CD-35.

##### A. LIFE SAFETY CODE

VA Construction Standard CD-35 requires that windows must comply with the latest edition of NFPA Standard No. 101 "Life Safety Code". This is an obvious, responsible and accepted requirement. Compliance should be achieved as a high priority, either through 1) direct compliance, 2) equivalency approaches (now recognized by all major code organizations) where other factors compensate for any deficiency, or 3) the judicious use of variances where equivalency is established.

The Code recognizes the necessity, in some cases, of restraining people. In such cases, provisions shall be made for continuous supervision and prompt release of restrained persons.

The existing windows, as well as the current replacements in Buildings 10 and 90 do not serve as a means of egress but do operate to allow smoke ventilation. No change is expected in the operation of the windows in any of the work to date, or in any of the recommendations of this report; therefore, continued compliance is expected.

The Code further charges the authority having jurisdiction, which in this case is likely to be the Director of the Medical Center, with making appropriate modifications to the Code.

##### B. SECRETARY OF THE INTERIOR'S STANDARDS AND GUIDELINES FOR REHABILITATING HISTORIC BUILDINGS

VA Construction Standard CD-35 requires that in historic buildings and potentially historic buildings (as defined by Executive Order 11593), the windows should conform to the "Secretary's of Interior's Standards for Rehabilitation". A copy of these Standards is attached as Appendix B. The "Standards" reflect a general, but internationally accepted recognition of the inherent value of original material, features and design characteristics as significant qualities which affect the character of historic buildings. The Standards are accompanied by "Guidelines" which assist with interpretation of the Standards by giving examples of treatments which do and do not meet the Standards. There are several publications series which support the Standards by providing technical information on appropriate rehabilitation techniques. A list of several of the publications which address steel windows is attached as Appendix F; single copies of any of these may be obtained from the Department of Interior, National Park Service, or the Center will be happy to provide copies.

Executive Order 11593, which requires that Federal Agencies identify and maintain the cultural resources under their jurisdiction, has the force of law. VA Construction Standard CD-35 does not appear to allow for any exceptions in its wording. Individuals in charge of specific sites have a responsibility for compliance. Federal Agencies are required to appoint Historic Preservation Officers to coordinate activities and assist with compliance. In some other code related situations, Federal sites may not be subject to local, state or model building codes; however, compliance with those codes, even the "Life Safety Code", may be self-imposed through administrative action. It should be recognized that the "historic" requirements which are often looked upon as peripheral, or secondary, are in fact stringent federal requirements. Compliance is not a matter of taste, or subjective judgement.

The most directly relevant Standards are:

- #2 The distinguishing original qualities or character of a building, structure, or site and its environment shall not be destroyed. The removal or alteration of any historic material or distinctive architectural features should be avoided when possible.
- #6 Deteriorated architectural features shall be repaired rather than replaced, wherever possible. In the event replacement is necessary, the new material should match the material being replaced in composition, design, color, texture, and other visual qualities. Repair or replacement of missing architectural features should be based on accurate duplications of features, substantiated by historic, physical, or pictorial evidence rather than on conjectural designs or the availability of different architectural elements from other buildings or structures.

The retention and weatherization of the existing windows would comply with this requirement. The replacement windows currently being implemented are seriously out of compliance because the replacement represents the loss of original material, features and configuration. The question of whether it is possible to repair and retain the original windows is central to whether replacement would be appropriate under the Standards. This issue will be addressed in the Section V. Existing Window Conditions.

### C. ENERGY CONSERVATION

The VA requires conformity to VA Construction Standard 31-1 "Building Envelope Energy Conservation Design" included as Appendix G. In addition, there are requirements that if double glazing is used, a) there be continuous thermal breaks between the inner and outer sash, and b) that horizontal Venetian blinds be enclosed between the two panes wherever possible.

We have reviewed the documents related to the refurbishing of the buildings at the VA Medical Center in Waco, Texas. The VA essentially requires the buildings to be designed to the ASHRAE 90A-1980 Standard, "Energy Conservation in New Building Design", with a few additions. The VA requires that buildings located in climates with a winter outdoor design temperature of 25 degrees F or below be equipped with double glazed windows to prevent condensation on the windows at the inside design conditions of 72 degrees F and 30% relative humidity. The outside design temperature at Waco is 26 degrees F. The Waco site just misses being required to have double glazed windows. There will be a significant number of hours when the outdoor temperature in Waco is below 25 degree F and condensation on the window will occur even though the design temperature is above 25 degrees F. Our review found no indication of humidifiers in the refurbished design. Without humidifiers, it is very difficult to maintain a particular humidity. The use of the 72 degree F and 30% inside design conditions is a little surprising. Research published in ASHRAE indicates that respiratory problems are reduced at indoor humidities of 50%.



Goetting and Associates appear to have done a thorough thermal analysis of Building No. 90 at Waco. We have reviewed much of the calculations available and can find no significant problem. Calculations used summer outside design conditions for all of the summer months, including October. This was partially responsible for the peak cooling design loads occurring in October. Calculations were made using a proprietary computer program by Elite Software Development, Inc for the thermal analysis of the buildings. We did not have a copy of this program, but it appears to use the ASHRAE standard commercial loads method presented in the "Cooling and Heating Load Calculation Manual", ASHRAE GRP-158. A summary of their calculations for 4pm in October is given in Table I below.

Notice that the loads due to ventilation as well as those due to people, lights and equipment are greater than the loads due to windows, i.e., windows represent the third largest load when equipped with double glazed windows.

TABLE I  
Load Distribution by Component  
Double Glazed Windows  
4 PM, October

<u>Component</u>	<u>Load</u>	<u>Percent</u>
Roof	53,588	2.6
Walls	74,562	3.6
Glass	274,420	13.1
People, lights, eqp.	477,566	22.8
Partitions	45,240	2.2
Infiltration	230,445	11.0
Ventilation	717,236	34.3
Fan Loads	127,351	6.1
Supply Duct Loads	49,116	2.4
Return Duct Loads	38,960	1.9
TOTAL LOADS		2,088,443 100.0

We have manually calculated the change in window loads for 4 pm in October associated with single glazed windows as opposed to the double glazed windows used in the calculations for the table above. Table II gives the results of these calculations. The window load increases from 274,420 BTU/hr to 453,342 BTU/hr when single glazed windows are used rather than double glazed. This represents an increase in window percentage of the total load from 13.1% of the total load to 20.0% of the total load. Window loads are still the third largest load, although very close to being the second largest load. This increase in window loads would require an increase in the mechanical system size of from 13-15 tons.

All of the difference between Tables I and II is not due to double glazing alone. The new double glazing is also tinted gray. The tint reduces the shading coefficient and thus the radiant load from the sun. Double glazing the existing windows would not be as good as the new double glazing unless the exterior glass is also replaced with tinted glass.

Although the accuracy of the manual calculation is less than that of the computer program used by Goetting and Associates, we believe that it is sufficient for the comparison given here.

This analysis has not addressed the effect of double glazed windows on thermal comfort. Window inside temperatures will be lower in summer and higher in winter with the double glazed windows. This will make the building more comfortable. It is our judgment that double glazing the windows, and the inclusion of an acceptable tint would be desirable though not required. While part of this is due to energy conservation benefits, we see the patient comfort issue as exceptionally important in intermediate and long-term health care facilities. To conclude, double glazing would be desired, but not required by VA Standard 31-1.



TABLE II  
Load Distribution by Component  
Single Glazed Windows  
4 PM, October

<u>Component Load</u>		<u>Percent</u>
Roof	53,588	2.4
Walls	74,562	3.3
Glass	453,342	20.0
People, lights, eqp.	477,566	21.1
Partitions	45,240	2.0
Infiltration	230,445	10.2
Ventilation	717,236	31.5
Fan Loads	127,351	5.6
Supply Duct Loads	49,116	2.2
Return Duct Loads	38,960	1.7
<b>TOTAL LOADS</b>	<b>2,267,365</b>	<b>100.0</b>

### OPERABILITY

VA Standard CD-35 for new construction requires operability, which allows cleaning and glazing from the inside. This provision seems intended to take advantage of contemporary windows which allow this feature through several options. The requirement contains provisions which subjugate it to historic or other design conditions.

Additional provisions for operability a) restrict projection to within the edge of the sill on exterior reveal of windows within 6'6" of grade level and b) avoidance of mechanically operated windows except where necessary.

Technically both the existing and replacement windows comply with this requirement although as replacements, the new windows did not achieve the desired operability stated in section 4.a of CD-35.

### SAFETY GLAZING

Standard CD-35 requires the use of laminated glass for all windows. This Standard does not specify any impact requirements other than that which is implied by the selection of the specified glazing strength. Reviews of project documentation and interviews with staff at VA Waco, indicate an additional impact test is applied to replacement windows; that of withstanding a single 200 lb. impact at 15 mph. The simulation is provided by a 200 lb. sandbag on a rope/cable, released from ceiling height. This test is not specified in CD-35 or other VA documentation, but does seem like a reasonable simulation of a patient attempting to jump through the window.

Our observation of the existing rolled steel windows is that they would not be structurally damaged in any way by this test. In fact, these units have met one important criteria over the past 40-55 years, they have stood the "test of time". Interviews with staff, and the review of correspondence, indicate that the original windows are adequate to resist the impact. The only new 1/1 unit to have successfully withstood this test is a prototype unit installed by Graham Architectural Products. Graham windows have not been used in any of the replacements to date.

With regard to this security requirement, it is our judgment that the existing original windows, and the replacements currently being used, would withstand any attempt to jump through them without failing or sustaining damage after the attempt. New windows would have to be checked to assure the integrity of the system; any failure of a component, such as the use of inadequate strength polycarbonate, or inadequate retaining strips, could lead to failure.

## V. EXISTING WINDOW CONDITIONS

A determination of the current physical condition of the windows is one of the most important aspects of planning for repair, rehabilitation or replacement. For historic or potentially historic buildings, such as those at the VA Medical Center at Waco, all of the original building fabric is considered significant. The VA Standard CD-35 requires that the "Secretary of Interior's Standards for Rehabilitating Historic Buildings" be followed. These standards require that "Significant original features and materials be repaired and retained wherever possible". In the determination of what is "possible", the condition assessment is important as a partial basis for decision making.

Steel windows are generally very durable. When evaluating steel windows, the kinds of deterioration which should be looked for may include broken glass, paint build-up, paint failure, rust, racking of the sash and/or failure of balances. Of these problems, only severe rusting, and warping or racking of the sash are the kinds of problems which may become so severe that it is infeasible to repair the units. As a point of reference, one recognized expert in New York City, where window standards are extremely stringent, has told us, during a phone interview, that he has "never had to replace" a steel window. He has worked with units in far worse condition, in the New York area, than any observed at the VA Medical Center, Waco. During the inspections of windows at the VA Medical Center, we were especially alert for problems which would make it infeasible to repair the windows.

### Method of Evaluation

The inspection of windows had two overall criteria to insure that a reasonable and careful study was made. The first was that the windows evaluated be representative of the windows of that type or age. This means that the units were typical of the overall conditions throughout the building and ultimately, the entire complex. The second was that we actively seek out the windows which were representative of the worst cases, throughout the Medical Center. To accomplish both of these overall objectives, Medical Center staff familiar with the buildings and windows accompanied us to insure that all of the problems and concerns of the staff were identified.

In project planning discussion with the VA staff, it was determined that funds were not available for a window by window survey of all affected buildings. It was agreed however that a sampling process would be adequate to determine the overall conditions and still allow recommendations to be made for the specific buildings of interest to the VA Medical Center.

Had there been a wide range of conditions or any unpredictable patterns of weathering and deterioration, it would have been necessary to expand this evaluation. The findings were, however, that even the "worse case" windows fell within an extremely narrow range of deterioration. There was not even a remarkable difference in the condition of windows on different exposures of the building. (Exposure can make a difference in deterioration rates; in some wood windows they can be almost missing in one elevation and reparable on more protected elevations.)

Windows were inspected to determine the following:

- condition of the frame (rust, paint, attachments, damage)
- condition of the top sash (rust, paint, glazing, warping)
- condition of the bottom sash (rust, paint, glazing, warping)
- operation
- weatherstripping

Buildings were chosen for age range, from the oldest to the latest buildings constructed from the architectural set of plans; and to assure that the worst case windows at the Center were evaluated. Buildings 1, 4 and 92 were chosen and windows were examined from different elevations to check

for different exposures and weathering. The age of the windows ranged from 45 to 55 years. Three types of windows were encountered:

- Steel double-hung multi-pane from the 1940s buildings, various sizes and configurations (Building 92)
- Steel double-hung multi-pane from the 1930s buildings, various sizes and configurations (Buildings 4 and 1)
- Steel hopper-type, projected windows in large bays, operated by mechanical cranks (Building 4)

The overall range of conditions is extremely narrow, with one exception in building 4. They are described in the following sections.

## BUILDING 92

Building 92 was inspected as an example of the worst conditions. This building dates from 1943, and contains a slightly more advanced window type than the 1930s buildings. We went upstairs and visually inspected units on one ward, on two exposures. We also looked at some new aluminum windows on the old sun porch. These steel windows were chosen because, according to VA staff, represented the worst case. One window was checked to the point of physically removing the stops. No other destructive testing was applied to the units. Observations about the windows in Building 92 include:

- There are numerous rolled steel components
- The windows were originally weather stripped with zinc and copper
- Copper weather stripping was on the bottom rail; zinc in the side channels
- The windows were designed to overlap with an "S" type hook at the meeting rail
- Tapes to balances were attached on all windows we examined. Balances are in the side channels. These balances are available in multiple sizes from current sources, see Appendix J.
- All windows were heavily over-painted, most recently with a latex paint. Up to 8 coats were visually identified in one case, and 12 in another. It is possible, therefore, that there are more layers, since there may be layers too thin to be visible to the unaided eye. Paint build-up was substantial, and in addition, the weather stripping at the bottom rail and stiles was over-painted with multiple coats, impairing its function. Weep holes designed into the window were painted over so that condensate could not escape. Often the paint is stained from the surface rusting and cracked and flaked, resulting in a dramatically unattractive appearance. This appearance belies the fact that the windows are in excellent shape structurally. The windows observed in Building 92 had minor surface or "flash" rust in some exposed areas. Given the thickness of the steel, this rust is insignificant and cosmetic, (sills are 12 gauge). Paint was covering all operating areas and had clogged and dripped into the side channels, impairing the opening/closing.
- Windows in Building 92 were poorly kept and dirty. The building was being emptied of patients in preparation for the next rehab, however the accumulations of dirt and debris have been growing over many years. This debris, combined with the over-painting and drips, has resulted in the almost uniform inability to close the windows throughout all the buildings we observed. The result of this is the presence of water on the floors from blowing rain, and complaints about infiltration. It should be realized that the steel



windows were made to close tolerances and properly operated will form a tight seal. Current malfunctions which have resulted in complaints are actually caused by the factors described above. It is not unusual; however, to encounter these problems after 50 to 60 years of maintenance and operation. The steel units themselves are in excellent condition. No units which are warped, racked, sprung or had other serious structural problems were observed. Even the original weatherstripping appears to be sound and could be functional if the excess paint is removed.

- We were unable to find the manufacturers name on the sash; however, it may be possible to identify the manufacturer if that becomes necessary to facilitate appropriate work.

#### BUILDING 4

Building 4, built in 1931, was chosen as an example of one of the original 1930s buildings, and also because it has higher levels of moisture as a kitchen facility. Because higher levels of moisture would be expected to create more rust and corrosion, this building seemed a likely candidate to house windows which would be among the worst in the complex.

- The double-hung windows in the older Building 4 were different from the units in 92. They were simpler, without the rolled sections and without the weather stripping. They were however, designed to seal by a U-shaped channel bottom rail to come down over a raised sill. The windows in Building 4 came down to stone sills, not steel panning as in the newer buildings.
- Three types of windows were inspected in Building 4; a 20/20 double or single-hung with a hopper-type arched top; the simple 12/16 double hung described in the previous section, and large banks of crank-out hopper type, projecting units.
- Examples of older Lexan panels used for reglazing small panes were observed in Building 4. These were uniformly yellowed and obscure from the effects of ultraviolet (UV) light. Some Lexan panes were scratched; their random appearance throughout the windows was disruptive and unattractive. It is indicative of the future appearance which can be expected from the Lexan in use in other parts of the complex, including the new interior panels. Newer Lexan XL may be more resistant to UV, if it is used, but this will simply delay the onset of the process.

The only substantive steel/structural problem we encountered was in the hopper type steel window subsill in the kitchen area. These were badly rusted and, at the edges, completely corroded away. Some bottom rails of these units has similar rust, but not to the point of rusting through. The banks of units are separated by a steel plate mullion, and there were complaints of being able to see through to the outside. We noted that there is caulking/putty between the mullion and the window frames. The holes were in the failed sealant, not due to rusted steel.

#### BUILDING 1

Building one is the oldest building at the Medical Center. It was constructed in 1931. The window type is generally the same type described in Building 4, above as the double-hung, multi-pane units, without weatherstripping.

The windows which were inspected were in closed patient areas, so that all windows were fully accessible. Units were inspected in bath areas to determine if the effects of moisture were similar to that encountered in Building 4 kitchen areas. There were not similar degrees of rust and corrosion, which at least raises the possibility that the deterioration of the lower hopper-type windows in Building 4, may be due in part to an inferior grade or different material.

- The windows did not have integral weatherstripping, but rather the same type of "tongue and groove" type seal design which was described in Building 4.
- the windows appeared to be structurally intact, with no warping or racking of the frames or sash, and no damage of the metal muntins.
- Only minor surface or "flash" rusting was observed, in areas not protected by the paint.
- Tapes to balances were attached on all windows we saw. Balances are in the side channels. Replacement balances are available in multiple sizes from current sources.
- All windows were heavily over painted, most recently with a latex paint. Up to 8 coats were visually identified in one case, and 12 in another. It is possible, therefore, that there are more, since there may be layers too thin to be visible to the unaided eye. Paint build-up was substantial. Weep holes designed into the window were painted over so that condensate could not escape. Given the thickness of the steel, this rust is cosmetic. Paint was covering all operating areas and had clogged and dripped into the side channels, impairing the opening/closing. This is the primary reason the windows are difficult to open and close.
- Windows in Building 1, were reasonably clean. A small amount of debris in the corners of the sills, or at the meeting rails, combined with the overpainting and drips, can result in the inability to close the windows effectively. This can result in the presence of water on the floors from blowing rain, and complaints about infiltration. It should be realized that the steel windows were made to close tolerances and properly operated will form a tight seal. Current malfunctions which have resulted in complaints are actually caused by the factors described above. It is not unusual to encounter these problems after 50 to 60 years of maintenance and operation. The steel units themselves are in excellent condition. No units which are warped, racked, sprung or other serious structural problems were observed.
- We were unable to find the manufacturers name on the sash in building 1; however, it may be possible to identify the manufacturer if that becomes necessary to facilitate proper maintenance and repair.

## GENERAL COMMENTS

During the inspections and discussions, several issues of importance to the overall planning were identified and discussed. These are presented under a "general" heading because they impact the facility wide planning for windows. The issues include:

Security - Periodic attempts have been made to break out or jump through the windows. No one has ever succeeded in jumping through the units; therefore, it is clear that they have stood the test of time. These windows do sustain occasional damage, however, and one has been breached by a patient who hammered away at the window uninterrupted for an extended period.

Maintenance - The steel windows, if properly refurbished, should be relatively maintenance free, i.e. as maintenance free as any new metal (steel or aluminum) window. They would require lubrication, a sound coat of paint, removal of all debris from tracks and other operational areas. A key point is that the windows should not be overpainted, and no paint should be applied to operating areas such as tracks and weatherstripping. No paint should be allowed to drip down into the side channels. It should be noted, however, that the same overpainting which has caused the appearance and operating problems, has also protected the steel sash and frames from rusting, hence their very good structural condition.

Future maintenance of any rehabilitated or new windows should include periodic inspections and not painting on a fixed (e.g. five-year) cycle. Also the windows should not be painted with paint type which produce thick layers such as latex, but relatively hard, thin layers such as an oil base paint.

Modifications - Over time, occasional modifications have taken place. Detention screens; stops and other accessories have been attached to the window. Often, when these are removed, holes are left or metal anchors are left in place. These are common points of rusting and beginning corrosion.

Overall Window Status - Window replacements have already taken place in selected buildings at the Medical Center. This has resulted in two distinct types of window appearances, a) the fine detailing of the multi-pane original units and b) the simpler one over one replacements.

A review of the buildings indicates that 6 buildings have replacement windows and 12 buildings still have original windows. This will be relevant when addressing the consistency of appearance within the Medical Center.

## VI. COMPARATIVE CASE STUDIES

Comparative case studies are valuable as a means of identifying and evaluating methods and techniques, as well as for determining reasonable costs. In an attempt to identify and select appropriate case studies to demonstrate the feasibility of appropriate treatments, we contacted numerous sources. CAC staff talked with:

- All VA Medical Centers in the Architectural Set
- Authors and Editors of NPS publications
- Members of the Steering Committee of the 1986 National Window Conference
- Selected authors of papers and speakers who are recognized experts
- Selected State Historic Preservation Officers
- Selected Association for Preservation Technology Members
- Window companies known for experience in Rehabilitation
- Members of the American Institute of Architects Committee on Architecture for Health
- Selected public and private Psychiatric Hospitals over 50 years old

These contacts resulted in numerous additional references to specific projects, firms and personnel. All leads were followed up to determine whether or not the projects embodied work that related to the problems, materials and techniques of the VA Medical Center at Waco. Over one hundred thirty (130) contacts were made during the study to insure thorough coverage of the issue. The discussion of the individual case studies should be prefaced, however, by some general remarks.

The VA Hospitals in the Architectural Set are not a viable source of instructive case studies to illustrate appropriate and feasible techniques of repair and replacement. While both wood and metal windows were used in the Architectural Set, most of the original windows have been replaced. The VA Medical Center at Waco appears to have retained more of its original integrity insofar as the windows are concerned, than most of the other facilities. It may be argued that since other VA Hospitals have replaced their windows, then VA Medical Center, Waco, should be allowed to do so. This would not be appropriate since "consensus does not confer correctness". Instead, models should be sought which provide guidance to the VA in achieving the desired level of quality and performance, in both repair and replacement work.

We continued to expand the over 130 contacts made for the draft report to identify 545 neuropsychiatric facilities around the U.S. and developed a short list of 112 facilities with a high probability of having buildings on, or eligible for, the National Register. Both phone calls and direct mail were used to solicit information from these 112 facilities. To this date 37 facilities have been contacted. We are also in the process of surveying mailing to another 40 facilities, whose responses will continue to come in to us. An additional report will be issued to include the final results and this may result in substitutions for the current three examples. All of the examples are from neuropsychiatric facilities.

In addition to the three case studies which follow, there are two other psychiatric hospitals whose experience is noteworthy. They are:

### **Patton State Hospital, Patton, CA**

This psychiatric facility was established in 1885. The original steel casement windows are still maintained. For security reasons they were designed with a steel grid on the interior of the window opening which is separate from the window. A problem arose when some of the patients would hang themselves on these exposed bars. As a result a technique was developed to install a lexan panel on the interior side of each steel grid.



## **Atascadero State Hospital, Atascadero, CA**

This psychiatric facility was constructed in 1954. Although not historically significant, the 36 year old hospital represents new construction which specified the use of steel windows. The original construction in 1954 specified steel windows from the William Bayley Company. The configuration of the windows is a fixed window with a projecting transom. These windows have divided lites of 6" X 9" and are glazed with tempered glass. The steel windows were chosen to meet the security needs of the facility. The windows have proven to be successful and continuing construction at the facility continues to incorporate the same William Bayley windows in new projects.

## **CASE STUDY NO. 1**

**Friends Hospital**  
Roosevelt Blvd. & Adams Ave.  
Philadelphia, PA 19124

Friends Hospital, founded in 1813, was the first private psychiatric hospital in the United States. It was built with steel double-hung windows throughout. In 1974 the architectural firm of Mirick Pearson Batcheler of Philadelphia began major rehabilitation work on the facility.

During the rehabilitation, it was decided to repair and retain the original steel windows as original materials and features of the building. The prime windows were stripped and repainted. Technical details from the sub-contractor are not available; however, two specifications from other sources are included in this report as Appendix H. (There are fairly standard procedures for this kind of work.)

The project did include the upgrading of the thermal performance of the windows by adding double glazing. To achieve this, a light weight interior storm window was used. This storm window is operable from the inside and virtually invisible from the outside. The storm window is not a security window.

## **CASE STUDY NO. 2**

### **St. Elizabeths Hospital**

2700 Martin Luther King Jr. Ave. SE  
Washington, DC 20032

This psychiatric facility, as mentioned in the historical section of this report, was originally part of the Government Hospital for the Insane in the District of Columbia, and became known as St. Elizabeths during the Civil War when part of the facility was appropriated by the Army and Navy to become the General and Quarantine Naval Hospital.

The original facility dates from around 1850. The original steel-double-hung windows are still in place and functional. Approximately ten years ago, a major rehabilitation of the facility was planned and implemented. The approximate cost of the rehabilitation project was \$22 million. During the rehabilitation, it was decided to retain the original steel windows. No major refurbishing was required. These original windows remain in place today. Additional information is being sought from the Architectural firm of Peck and Peck; and the hospital staff on the type and nature of the preventive maintenance program, if any, used on the windows to keep them sound and operable.

### **CASE STUDY NO. 3**

**Camarillo State Hospital & Developmental Center**  
**Box A**  
**Camarillo, CA 93011**

The psychiatric facility at Camarillo dates from the late 1930s. The buildings were constructed with steel casement windows and the original windows are still in place. These windows underwent refurbishing about 8 to 10 years ago.

Approximately 8-10 years ago, the decision was made to retain and refurbish the original windows. It was decided to conduct the rehabilitation of the windows using in-house maintenance staff. It is not yet known if this was because outside contractors were not available or because the expertise and availability of staff allowed it to be done.

The original windows were rehabilitated in place. The metal was scrapped, chipped and wire-brushed. Windows were then primed and repainted. Additional information on costs and techniques has been requested from the Hospital staff.

## VII. RESOURCES FOR PRODUCTS AND SERVICES

It is often not adequate to tell someone what to do, without providing additional guidance on how to accomplish the work. The Center is maintaining and building a database of window manufacturers and companies which provide rehabilitation, repair and weatherization services. We have expanded that list through this study and have a very comprehensive list of resources available to the VA. The list of companies is attached as Appendix I and is divided into three categories:

- a) Retrofit Companies,
- b) Manufacturers of Steel Windows,
- c) Manufacturers of Aluminum Windows.

Of the 45 firms listed, 10 have been contacted by the VA during the course of the rehabilitation program. Of the 14 retrofit companies, 6 are located in Texas; of the 6 in Texas, three are new references. All 45 of these firms have been contacted by mail, phone or both and two have been interviewed in meetings. A short list has been developed of those resources/vendors expressing an interest in the repair or appropriate replacement of windows at the VA in Waco. The short list is included in Appendix I and noted as such. Many of the companies were willing to give pro-forma estimates of the costs of the products or services they provide. In many cases, vendors provided supplementary information in the form of blue prints, product literature, specifications and other material which was not included in this report. Upon request, the Center will furnish copies of any, or all, of the background information to the VA.

The surveys have identified some resources, previously unknown to the VA, who are interested in and willing to work with the VA on either repair or steel replacements. Two consultants/vendors of special note are either located in Texas, or involved in design discussions with the project architects, i.e. Leeds-Clark and Optimum Windows.

There were also two steel window rehabilitation experts who are located in the New York City area, and who expressed an interest in the project. These vendors are listed separately on the vendor short list in Appendix I as consultants. They both indicated that they would not desire to take their crews to Texas, but that they could work with the VA to scope out the project, train and supervise local contractor crews to rehabilitate the windows.

Once an appropriate and acceptable solution has been adopted by the VA, it is strongly recommended that a procurement action be taken to assure that either the repair services and refurbishing treatments, or replacement windows will be used in all future building rehabilitation. The use of different manufacturers products on each building results in the probable loss of visual integrity and continuity; differences in quality and durability; possible differences in warranty and service, and differences in hardware. Such differences make the job of maintenance personnel more complicated by having to stock, order or repair a variety of different components. Simplification and standardization of components will make the maintenance and repair functions more efficient and result in a higher level of quality and consistency across the facility.

Our contacts and discussions confirm that numerous resources exist which can assist the VA in achieving any of the recommendations of this report. The selection of an experienced contractor is the most important factor in assuring successful results. Some of the firms listed work nationwide, and other resources may be available to help with the planning.

See Appendix I for the list of firms.

## VIII. RECOMMENDATIONS AND ALTERNATIVES

The recommendations presented in this section are based upon the findings in all of the preceding sections. It is recommended that the reader carefully study the findings of each of the preceding sections as important background. A matrix has been prepared to assist in the comparison of options and costs. The matrix is included as Figure 1, on the following page.

To briefly summarize the findings and the basis of the following recommendations:

- The VA Medical Center at Waco is significant for its role in the development of health care delivery in the U.S., and the windows are significant to the buildings both as original material and the fact that they represent the technology of the day when the "architectural set" was developed to provide safe, sanitary and fireproof construction.
- The VA requires, via its Construction Standard C-35, that five standards and objectives be met; including NFPA 101; the Secretary of Interior's "Standards for Historic Preservation Projects and ASHRAE Standards. Of these, the Secretary's Standards and NFPA 101 are the two primary determinants. Other requirements are subjugated to these two. Of these two primary standards, the original windows meet NFPA 101 and the Secretary of the Interior's Standards, and have met any security requirements by having stood the "test of time". The purpose of all of these standards is the assurance of high-quality, durable, functional and thermally efficient building components for the benefit of owners, occupants and the community at large. The safety and comfort of patients and staff are an important part of these objectives.
- The overall structural condition of the steel windows at the VA Medical Center is quite good, with the exception of those noted in Building 4. The problems of overpainting, debris, balances, etc. which are due normal for windows of this age which have not been refurbished or rehabilitated.
- There are numerous resources available to provide effective repair services for the existing steel windows, including the design of effective double glazing techniques. See the attached list of companies in Appendix I.
- Identified case studies clearly indicate that it is feasible to find solutions which are acceptable to the reviewing authorities, fall within the budget figures projected for the current work, and meet the VA standard for maintaining original fabric.

The following recommendations are presented in order of the primary recommendation and the alternatives, in order of preference. These recommendations should not be considered to be mutually exclusive, in fact, at some points in the work at the site, each of the following recommendations may be useful and appropriate, given a specific problem or set of conditions.

The following recommendations are also made with a full understanding of the context of the ongoing rehabilitation program at the Medical Center in Waco. Under no circumstances should the work on, or cost of, the windows in future rehabilitation projects jeopardize the important program to upgrade and realign the complex to meet the anticipated future needs of the VA constituency for intermediate and long term care. Based upon the findings of this study, we believe that the primary recommendation is feasible to implement and cost-effective. While alternative one will meet all of the requirements, and be substantially less expensive, we feel it will be somewhat less satisfactory for the VA, than the primary recommendation.



**OPTIMUM AND ALTERNATIVE WINDOW SOLUTIONS**

	Repair Prime, add inner window	Repair Prime	Steel Replacement	Aluminum Replacement
<b>HISTORIC - REPAIR/MAINTAIN</b> "Deteriorated architectural features shall be repaired rather than replaced wherever possible." <sup>2</sup>	X	X		
<b>HISTORIC - ORIGINAL MATERIAL</b> "In the event replacement is necessary, the new material should match the material being replaced in composition, design, color, texture, and other visual qualities." <sup>2</sup>	X	X	X	
<b>HISTORIC - VISUAL QUALITIES</b> (See above)	X	X	X	X
<b>SECURITY</b> "It was determined that the interior glazing must sustain a 200lb impact at a velocity of 15mph." <sup>3</sup>	X	X	X	X
<b>ENERGY</b> "Double glazed windows with continuous thermal break shall be used where the outdoor heating design temperature is 25 °F dry bulb or lower to prevent condensation on window glass at the 72 °F dry bulb 30% relative humidity inside design temperature." <sup>4</sup>  Primary consideration for patient comfort.	X		X	X
<b>OPERABILITY</b> Single-motion operability (tandem). "All windows shall be operable so that both sides can be washed and glazed from within the building... unless historic design compatibility or other specific condition dictate otherwise..." <sup>1</sup>		X	X	X
<b>MAINTENANCE/DURABILITY</b> "Cleaning: Station requests all surfaces be cleaned from inside...The VA may waive this item if all other criteria are met." <sup>3</sup> "Durability: Finish needs to be of a type paint that will not require repainting frequently." <sup>3</sup>	X	X	X	
<b>COST*</b>	\$925 to \$1035 (\$2418) <sup>5</sup>	\$225 to \$335 (\$1745) <sup>5</sup>	\$1800 to \$1850	\$963 to \$2500

<sup>1</sup>VA Construction Standard CD-35

<sup>2</sup>Secretary of the Interior's "Standard for Rehabilitation and Guidelines for Rehabilitating Historic Buildings"

<sup>3</sup>letter from Vaughn Bomberger to Edward Tarasovich 10-7-87

<sup>4</sup>VA Construction Standard 31-1

<sup>5</sup>A repair estimate previously obtained by the project architects, outside the study.

\*See vendor short list, Appendix I; replacement may not include removal of existing windows (R.S. Means Estimates \$75.00 per opening).

FIGURE 1

## GENERAL RECOMMENDATIONS

In addition to the specific recommendations for windows, there are two general recommendations which would help prevent some of the difficulties which have surrounded the window planning and selection. Both recommendations may also be applied to other aspects of building rehabilitation than windows.

The first general recommendation is to adopt a structured approach to planning for rehabilitation work on all historic or contributing buildings. Such an approach will help identify important issues early in the planning process and insure that approaches are taken which will identify and protect important features and materials, as well as identify needed products, services and vendors. In recognition of the importance of this, Architectural Graphic Standards has incorporated a planning checklist in the latest edition. We recommend that the VA consider adopting this as part of the planning for construction projects on historic and potentially historic buildings. A copy of the checklist is included as Appendix D.

The second general recommendation is to modify the painting program to repaint only as required to maintain a sound and attractive appearance. In addition, proper surface preparation should be given a higher priority for operable systems, such as windows and doors. More frequent removal of existing paint layers may be necessary in such areas. The build-up of paint and inter-coat failure are two of the biggest problems which occur with paint.

A further recommendation is made for consideration by all parties. It relates to a level of reasonableness to be applied in the review process. The VA Medical Center in Waco is a historically significant complex, but it is not a museum building, nor likely to be one. It has an operating mission as a hospital and one which provides quality care and patient environments. This consideration has played a significant role in the review of the interiors at the Medical Center. Although our professional judgement is that the windows are in very good condition structurally and can practically and feasibly be repaired using vendors listed in Appendix I at lower costs than replacement, we also recognize that visually compatible steel replacement options are available.

It is our judgement that, while the recommendations of this report are prioritized and the primary recommendation offers maximum compliance with reasonable costs, the owner of the facility should have some latitude to repair or reglaze based upon operational considerations or other subjective factors. This is only if the owner, the VA, maintains the current visual appearance to the public is unchanged. It appears that this is possible using a steel replacement window, as noted in alternative two.

The replacement solution offered by Optimum Windows appears to offer an integrated true light window with integral lexan security panel which provides double glazing.

## PRIMARY RECOMMENDATION

The steel windows in the contributing buildings of the VA Medical Center are significant to those buildings, and, based upon the evaluation procedure described in Section V, are uniformly in excellent structural condition, with the exception of selected windows noted in Building 4. It is our judgement that they should be repaired and rehabilitated, and that further, if such repair and rehabilitation is done properly, these windows can be returned to a "like new" condition with relatively modest technical effort and cost. To this end, two draft specifications have been developed and are attached as Appendix "E", to address the technical requirements and estimated costs for the primary window repair. Both specifications are from experienced vendors who have expressed an interest in the work and are included in the vendor short list in Appendix I. The majority of complaints and concerns about the existing windows are due to cosmetic imperfections, mainly introduced due to excessive painting and the inability of routine maintenance to clear the windows of debris. A thorough rehabilitation of a building component, such as windows, after over 50 years



of service life is quite reasonable and proper, and the existing windows are in need of such a rehabilitation.

We further recommend that the windows be double-glazed, using methods similar to that developed and used for current rehabilitation projects, as in Building 90. Note that double glazing is not strictly required according to the VA Construction Standard and ASHRAE, however we feel that the VA has legitimate concerns with increasing the thermal efficiency, if it can be done in a cost-effective manner. The primary factor which leads us to this recommendation, however, is not strictly thermal, and that is "patient comfort". Even though the VA is just outside the design parameter which would require double glazing, the anticipation of intermediate and long-term patient residency, leads us to conclude that the reduction in fluctuation of window temperature would be important to occupant comfort.

The double glazing of the existing, original sash will require a design to accommodate this in a manner which is reliable, attractive and safe. The development of such a product design is outside the scope of this project, however the following suggestions may be helpful:

- there are many professionals with experience in these issues listed in the resource listings in Section VII. Consult reputable, experience designers even if this requires extra effort in the development of appropriate contract vehicles
- if future rehabilitations will have similar increases in wall thickness as building 90, then a similar technique of adding a second, connected but independent window may be just as effective
- if the connections between the primary and secondary windows in Building 90 work, and they are based on screwing a channel between the inner and outer bottom rails, then effective connections could be developed between the original steel window and a new interior, double-hung storm with polycarbonate glazing. Such connections might include the welding of connectors to the primary window and hooking onto the new interior security window.

The staff of the VA Medical Center is correct when they describe the problems with the existing original windows. They are difficult or impossible to operate and close. The occasional staining of the light paint from limited areas of flash rusting, often make the windows unattractive and appear in worse condition than they actually are. The reasons for this have been described in detail in this report and for a quick summary, the reader may refer to the Question and Answer section, Section IX. All of the cosmetic and operational problems can be easily corrected.

If the windows are thoroughly stripped down and refinished as described in the sample specifications, they will appear and function as "like-new" windows. Virtually all of the problems will be eliminated if the work is done properly. Removal of the sash will almost be mandatory to clean to bare metal, prime, and paint. Contractor selection is very important. Contractors with experience and a track record for quality work, thoroughness and timeliness should be identified.

#### ALTERNATIVE ONE

This option is considerably less expensive than any of the other solutions. It does however not offer the best solution in terms of energy and comfort. An alternative choice would be to retain and repair the existing original steel windows and not to double glaze them. While this is less desirable from the standpoint of patient comfort, it is technically acceptable as double glazing is not required by the VA Construction Standard and ASHRAE for Waco. Further, the cost of the interior window will be a determinant in whether or not is cost effective to double glaze the openings. We suspect that the cost of \$2300 per opening of Building 90, is not cost-effective from an energy standpoint, while the costs in some of the earlier projects of \$600-\$700 per opening may be cost effective. This

**APPENDIX A**

**MEMORANDUM OF AGREEMENT FOR HISTORIC PRESERVATION PLAN**

# Advisory Council On Historic Preservation

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The Old Post Office Building  
1100 Pennsylvania Avenue, NW. #809  
Washington, DC 20004

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JAN 18 1989

Mr. Robert L. Neary, Jr.  
Director, Office of Planning  
and Development  
Office of Facilities  
Veterans Administration  
Washington, DC 20420

REF: Renovation of Buildings 10 and 90, VAMC-Waco, Waco, TX

Attn: Daniel Sponn

Dear Mr. Neary:

The enclosed Memorandum of Agreement for the referenced project has been accepted by the Council. This acceptance completes the requirements of Section 106 of the National Historic Preservation Act and the Council's regulations. A copy has of the Agreement has also been sent to the Texas State Historic Preservation Officer.

We appreciate your cooperation in reaching a satisfactory resolution of this matter.

Sincerely,  
...

Don L. Klima  
Director, Eastern Office  
of Project Review

Enclosure

## MEMORANDUM OF AGREEMENT

WHEREAS, the Veterans Administration (VA) has determined that the renovation of buildings No. 10 and 90 at the VA Medical Center, Waco, Texas (VAMC) will have an effect upon the VAMC, an historic district determined eligible for inclusion in the the National Register of Historic Places, and has consulted with the Texas State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (Council) pursuant to 36 CFR Part 800, regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. 470f); [and Section 110(f) of the same Act (16 U.S.C. 470h-2(f)) and

NOW, THEREFORE, the VA, the Texas SHPO, and the Council agree that the undertaking shall be implemented in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

### Stipulations

The VA will ensure that the following measures are carried out:

1. The VA will, in consultation with the Texas SHPO and the Council, develop a plan for a research study (study) of steel windows at the VAMC to serve as a guide for future renovation projects which affect steel windows, with the exception of the renovation of Buildings 10 and 90. This study will become part of the Historic Preservation Plan, described in Item 3.

2. The study will include, but not be limited to the following:

- A. An analysis of all of the technical and functional requirements of steel windows at the VAMC. The analysis will include a listing of functional requirements, code and industry standards, and unique requirements of the window to accommodate the needs of a psychiatric facility. A matrix type comparison shall be made of the optimum retrofit proposal to that of a replacement window.

- B. Data from at least three hospitals with facilities similar to the Waco VAMC and with historic buildings containing steel windows, which will give a comparison of their specifications for steel window rehabilitation to those of the Waco VAMC. An explanation of any discrepancy in the VA specifications as opposed to those of the other facilities shall be incorporated as part of the study.



C. A summary giving the state of repair of the steel windows remaining at the VAMC.

D. Recommendations for the treatment of steel windows in renovation projects which will address historic preservation concerns as well as meet the medical/environmental needs of the VAMC.

E. A comprehensive survey of companies that deal with the rehabilitation of steel windows to determine those companies which have the ability to conduct the rehabilitation of steel windows as recommended in Item 2D. Major limiting factors include cost and the size of the project. The survey is restricted to the identification of firms and the solicitation of technical proposals from the firms. It is to be understood that the VA will not become obligated as a result of the solicitation.

F. SCHEDULE: The research study will be developed in consultation with the Texas SHPO and the Council in the following order:

1. Within 30 days of the ratification of this Agreement, the VA will provide concurrently for review a draft scope of work for the study to the Council and the Texas SHPO. The Texas SHPO and the Council will provide the VA with comments within 15 days of receipt of the draft study. The VA will take those comments into consideration in developing the final study.

2. Within 4 months of expiration of the review period on the draft scope of work, the VA will concurrently provide a draft study for review to the Council and the Texas SHPO. The Texas SHPO and the Council will provide the VA with comments within 30 days of receipt of the draft study. The VA will take those comments into consideration in developing the final study.

3. Within 1 month of expiration of the comment period on the draft study, or within a time period mutually agreed upon by the VA, the Texas SHPO and the Council, the VA will issue a final research study, with copies to the Council and the Texas SHPO.

3. The VA will, in consultation with the Texas SHPO and the Council, develop and implement a plan for the management of cultural resources (termed an Historic Preservation Plan) for the VAMC Waco. This plan will serve as a pilot project for a nation-wide initiative to complete historic preservation plans for all VAMC facilities, contingent on Congressional funding. Work carried out in accordance with the Plan,

approved in accordance with this Agreement, will require no further review by the SHPO or the Council.

The Plan will include, but not be limited to the following:

A. OVERVIEW: This will include a summary of the historic utilization and development of the VAMC, an analysis of its cultural and architectural evolution; a projection of the types and likely locations of archeological properties that are expected to be found; a summary of past surveys on which these projections are based; and other investigation strategies for the identification and evaluation of historic, architectural and cultural properties.

B. IDENTIFICATION, INVENTORY and EVALUATION: This will include a procedure to be used at the VAMC for determining whether historic, architectural and cultural properties meet the eligibility criteria of the National Register of Historic Places (National Register) which will provide for consultation with the Texas SHPO and, if necessary, the Secretary of the Interior, as set forth in 36 CFR Part 800.4. The procedure should include, but not be limited to the following:

1. Identification and evaluation of all resources located within the VAMC to determine their level of contribution to the district. (In addition to structures of historic, architectural, and cultural significance, the evaluation should include significant interior spaces, landscaping, open spaces and archeological resources.)
2. A process by which the existing boundaries of the historic portion of the VAMC will be re-evaluated based on the findings of the identification process and, if appropriate, resubmitted to the Secretary of the Interior for modification.
3. A process by which previously undiscovered resources that meet the criteria for inclusion in the National Register will be submitted to the Secretary of the Interior for consideration.

Based upon an inventory and evaluation, buildings and structures will be categorized in accordance with treatment recommendations.

C. TREATMENT: Establishment of standards and procedures for the treatment of all identified resources within the VAMC, developed in consultation with the Texas SHPO. These standards and procedures should include, but not be limited to the following:

1. protecting, preserving, and maintaining appropriate resources in place as part of the ongoing management of the VAMC;

2. rehabilitation in accordance with the Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (Standards);

3. stabilization and continued maintenance;

4. documentation to the standards of the Historic American Buildings Survey for those structures which will be substantially altered or demolished;

5. archeological data recovery and provisions for permanent curation of all specimens, field notes, photographs, negatives, and processed data at an appropriately equipped institution that meets the standards set forth in Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines (48 FR 44716 et. seq.) and that makes this data available to other parties for research or other appropriate purposes;

6. a process for selecting an appropriate alternative to undertakings that would have an adverse effect on resources which would include consultation with the Texas SHPO and, if necessary, the Council. Alternatives considered under this process should include the lease or sale of properties to organizations or individuals that would agree to rehabilitate and maintain properties in accordance with the standards established in the Plan; and,

7. a procedure to be followed, if, after meeting all the responsibilities for identification of properties, the VAMC finds, or is notified after an undertaking has begun, that the undertaking will affect a previously unidentified National Register eligible property. This procedure may require consultation with the Secretary of the Interior and compliance with Section 80011 of the Council's regulations.

D. SCHEDULE: The Plan will be developed in consultation with the Texas SHPO and the Council in the following order:

1. Within 60 days of the ratification of this Agreement, the VA will provide concurrently for review a draft scope of work for the Plan to the Council and the Texas SHPO. The Texas SHPO and the Council will provide the VA with comments within 30 days of receipt of the draft scope of work. The VA will take those comments

into consideration in developing the final scope of work.

2. Within 6 months of expiration of the review period on the draft scope of work, the VAMC will concurrently provide a draft Plan for review to the Council and the Texas SHPO. The Texas SHPO and the Council will provide the VA with comments within 30 days of receipt of the draft plan. The VA will take those comments into consideration in developing the final Plan.

3. Within 2 months of expiration of the comment period on the draft plan, or within a time period mutually agreed upon by the VAMC, the Texas SHPO and the Council, the VA will issue a final Plan, with copies to the Council and the Texas SHPO.

4. Should the VA desire to modify the Plan, the Council and the Texas SHPO will be afforded 30 days in which to review and comment upon proposed modifications.

5. The VA will consult with the SHPO and the Council in an effort to resolve any objections or respond to any comments received on the scope of work or the Plan.

6. Within 30 days of issuance of the final Plan, the VA will initiate implementation of the Plan at the VAMC.

E. PLAN STANDARDS: The VA will ensure that the Plan is consistent with and responsive to the values of the VAMC, those other properties identified as eligible for the National Register, and pertinent sections of the following guidelines and standards.

\*The Archeological Survey: Methods and Uses (DOI, 1978; GPO Stock No. 024-016-00091-9).

\*Preservation Planning in Context (ACHP).

\*Archeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines, 48 FR 44716 et. seq., September 29, 1983.

\*The Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings (Revised 1983).

\*The standards of the Historic American Buildings Survey (HABS) for recording architectural, historical, and engineering properties, as determined in consultation with HABS, National Park Service, Department of the Interior.

4. Prior to completion and implementation of the Plan, all projects that may affect the VAMC, or other properties



identified in Stipulation 11, will be handled in accordance with Council regulations, with the following exceptions. These undertakings will have no effect on the properties and will require no review by the SHPO or the Council.

a. All maintenance work on elements that are not visible or that do not contribute to the historic or architectural significance of the resource.

b. Replacement in-kind, i.e. matching the configuration, material, size, detail, color, and construction of the historic fabric or landscaping.

c. Refinishing in-kind, e.g. painting surfaces with the same materials and same color.

d. Energy conservation measures that are not visible or that do not alter or detract from those qualities that make the resource eligible for the National Register, i.e.,

- \*modification to the HV & A/C control systems, conversions to alternative fuel;

- \*insulation in roofs, crawl spaces, ceiling, attics, walls, floors, and around pipes and ducts. (This exclusion does not include the installation of urea formaldehyde or other materials that induce or introduce moisture into a building);

- \*the installation of storm doors or windows; or insulated double or triple glazing, which match the size, color, profile and other distinguishing characteristics of the historic door or window, and which meet the Standards;

- \*interior modifications when the significance of the building does not include the interior space;

- \*caulking and weather stripping, provided that the color of the caulking is consistent with the appearance of the building; and,

- \*replacement or modification of the lighting systems when the modifications do not alter or detract from the significance of the resource.

5. Rehabilitation work that is carried out in accordance with the Standards will have no adverse effect and will require no review by the Council. Plans and specifications for all rehabilitation work will be submitted to the Texas SHPO for review and comment as early as possible.

6. Rehabilitation work that cannot meet the Standards, and new construction activities at the VAMC that will affect resources, will be submitted to the Texas SHPO and the Council in accordance with Section 800.4 of the Council's regulations.

7. All demolition work within the VAMC will be submitted to the Texas SHPO and the Council in accordance with Section 800.4 of the Council's regulations.


8. Prior to any alteration or demolition of any identified resources, those properties will be recorded so that there is a permanent record of their history and appearance. The VAMC will first contact HABS which will determine what documentation is required. All documentation must be accepted by HABS, and the Texas SHPO and Council notified of its acceptance, prior to the alteration or demolition. Copies of this documentation will be provided to the Texas SHPO.


9. Copies of reports, plans, or other products generated under this agreement and in the implementation of the Plan will be provided to the Texas SHPO for review and comment. The Texas SHPO will also be provided with copies of all site survey forms, photographs, USGS topographic maps indicating areas actually surveyed and precise locational information of all recorded resources and any other relevant maps or documents.

10. Copies of any final technical reports will be furnished to the Texas SHPO. Locational information for archeological resources may be withheld from final technical reports that are likely to be available to the public where release of such information might increase vandalism or misuse of a cultural property.

11. This Agreement will be reviewed by the consulting parties 12 months from its ratification date to determine if any of the terms of the Agreement cannot be met or if a change is necessary. If any of the signatories to this Agreement determines that its terms cannot be met, that signatory will immediately request the consulting parties to consider an amendment or addendum to the Agreement. Such an amendment or addendum will be executed in the same manner as the original Agreement.

Execution of this Agreement evidences that the VA has afforded the Council an opportunity to comment on the continued operation, maintenance and development of the VAMC and the effects of these activities on that property, which is eligible for inclusion in the National Register.

  
\_\_\_\_\_  
Advisory Council on Historic  
Preservation

 1/17/58  
\_\_\_\_\_  
(Date)

DEC 19 1988

*for*  
Director, Office of Facilities (08)  
VETERANS ADMINISTRATION

(Date)

*11*  
*16 Aug 1988*  
~~\_\_\_\_\_~~  
Texas State Historic Preservation  
Officer

(Date)

*12/5/88*  
~~\_\_\_\_\_~~  
Deputy Chief Medical Director (10A)  
VETERANS ADMINISTRATION

(Date)

**APPENDIX B**

**SECRETARY OF INTERIOR'S STANDARDS FOR REHABILITATION**



## THE SECRETARY OF THE INTERIOR'S STANDARDS FOR REHABILITATION

The Secretary of the Interior is responsible for establishing standards for all programs under Departmental authority and for advising Federal agencies on the preservation of historic properties listed or eligible for listing in the National Register of Historic Places. In partial fulfillment of this responsibility, the Secretary of the Interior's Standards for Historic Preservation Projects have been developed to direct work undertaken on historic buildings.

Initially used by the Secretary of the Interior in determining the applicability of proposed project work on registered properties within the Historic Preservation Fund grant-in-aid program, the Standards for Historic Preservation Projects have received extensive testing over the years—more than 6,000 acquisition and development projects were approved for a variety of work treatments. In addition, the Standards have been used by Federal agencies in carrying out their historic preservation responsibilities for properties in Federal ownership or control; and by State and local officials in the review of both Federal and nonfederal rehabilitation proposals. They have also been adopted by a number of historic district and planning commissions across the country.

The Standards for Rehabilitation (36 CFR 67) comprise that section of the overall historic preservation project standards addressing the most prevalent treatment today: Rehabilitation. "Rehabilitation" is defined as the process of returning a property to a state of utility, through repair or alteration, which makes possible an efficient contemporary use while preserving those portions and features of the property which are significant to its historic, architectural, and cultural values.

The Standards for Rehabilitation are as follows:

1. Every reasonable effort shall be made to provide a compatible use for a property which requires minimal alteration of the building, structure, or site and its environment, or to use a property for its originally intended purpose.
2. The distinguishing original qualities or character of a building, structure, or site and its environment shall not be destroyed. The removal or alteration of any historic material or distinctive architectural features should be avoided when possible.
3. All buildings, structures, and sites shall be recognized as products of their own time. Alterations that have no historical basis and which seek to create an earlier appearance shall be discouraged.
4. Changes which may have taken place in the course of time are evidence of the history and development of a building, structure, or site and its environment. These changes may have acquired significance in their own right, and this significance shall be recognized and respected.

5. Distinctive stylistic features or examples of skilled craftsmanship which characterize a building, structure, or site shall be treated with sensitivity.

6. Deteriorated architectural features shall be repaired rather than replaced, wherever possible. In the event replacement is necessary, the new material should match the material being replaced in composition, design, color, texture, and other visual qualities. Repair or replacement of missing architectural features should be based on accurate duplications of features, substantiated by historic, physical, or pictorial evidence rather than on conjectural designs or the availability of different architectural elements from other buildings or structures.

7. The surface cleaning of structures shall be undertaken with the gentlest means possible. Sandblasting and other cleaning methods that will damage the historic building materials shall not be undertaken.

8. Every reasonable effort shall be made to protect and preserve archeological resources affected by, or adjacent to any project.

9. Contemporary design for alterations and additions to existing properties shall not be discouraged when such alterations and additions do not destroy significant historical, architectural or cultural material, and such design is compatible with the size, scale, color, material, and character of the property, neighborhood or environment.

10. Wherever possible, new additions or alterations to structures shall be done in such a manner that if such additions or alterations were to be removed in the future, the essential form and integrity of the structure would be unimpaired.

## Windows

A highly decorative window with an unusual shape, or glazing pattern, or color is most likely identified immediately as a character-defining feature of the building. It is far more difficult, however, to assess the importance of repeated windows on a facade, particularly if they are individually simple in design and material, such as the large, multi-paned sash of many industrial buildings. Because rehabilitation projects frequently include proposals to replace window sash or even entire windows to improve thermal efficiency or to create a new appearance, it is essential that their contribution to the overall historic character of the building be assessed together with their physical condition before specific repair or replacement work is undertaken. See also Energy Retrofitting. Preservation Briefs: 9 should be consulted for specific guidance on wooden window repair. (See Reading List and Ordering Information on pg. 58.)

### Recommended

**Identifying, retaining, and preserving** windows--and their functional and decorative features--that are important in defining the overall historic character of the building. Such features can include frames, sash, muntins, glazing, sills, heads, hoodmolds, panelled or decorated jambs and moldings, and interior and exterior shutters and blinds.

**Protecting and maintaining** the wood and architectural metal which comprise the window frame, sash, muntins, and surrounds through appropriate surface treatments such as cleaning, rust removal, limited paint removal, and re-application of protective coating systems.

### Not Recommended

Removing or radically changing windows which are important in defining the overall historic character of the building so that, as a result, the character is diminished.

Changing the number, location, size or glazing pattern of windows, through cutting new openings, blocking-in windows, and installing replacement sash which does not fit the historic window opening.

Changing the historic appearance of windows through the use of inappropriate designs, materials, finishes, or colors which radically change the sash, depth of reveal, and muntin configuration; the reflectivity and color of the glazing; or the appearance of the frame.

Obscuring historic window trim with metal or other material.

Stripping windows of historic material such as wood, iron, cast iron, and bronze.

Failing to provide adequate protection of materials on a cyclical basis so that deterioration of the windows results.

## Windows (continued)

### Recommended

Making windows weathertight by re-caulking and replacing or installing weatherstripping. These actions also improve thermal efficiency.

Evaluating the overall condition of materials to determine whether more than protection and maintenance are required, i.e. if repairs to windows and window features will be required.

**Repairing** window frames and sash by patching, splicing, consolidating or otherwise reinforcing. Such repair may also include replacement in kind of those parts that are either extensively deteriorated or are missing when there are surviving prototypes such as architraves, hoodmolds, sash, sills, and interior or exterior shutters and blinds.

**Replacing** in kind an entire window that is too deteriorated to repair--if the overall form and detailing are still evident--using the physical evidence to guide the new work. If using the same kind of material is not technically or economically feasible, then a compatible substitute material may be considered.

**The following work is highlighted to indicate that it represents the particularly complex technical or design aspects of rehabilitation projects and should only be considered after the preservation concerns listed above have been addressed.**

### **Design for Missing Historic Features**

Designing and installing new windows when the historic windows (frame, sash and glazing) are completely missing. The replacement windows may be an accurate restoration using historical, pictorial, and physical documentation; or be a new design that is compatible with the window openings and the historic character of the building.

### Not Recommended

Retrofitting or replacing windows rather than maintaining the sash, frame, and glazing.

Failing to undertake adequate measures to assure the preservation of historic windows.

Replacing an entire window when repair of materials and limited replacement of deteriorated or missing parts are appropriate.

Failing to reuse serviceable window hardware such as brass lifts and sash locks.

Using a substitute material for the replacement part that does not convey the visual appearance of the surviving parts of the window or that is physically or chemically incompatible.

Removing a character-defining window that is unrepairable and blocking it in; or replacing it with a new window that does not convey the same visual appearance.

Creating a false historical appearance because the replaced window is based on insufficient historical, pictorial, and physical documentation.

Introducing a new design that is incompatible with the historic character of the building.



## Windows (continued)

### Recommended

#### Alterations/Additions for the New Use

Designing and installing additional windows on rear or other-non character-defining elevations if required by the new use. New window openings may also be cut into exposed party walls. Such design should be compatible with the overall design of the building, but not duplicate the fenestration pattern and detailing of a character-defining elevation.

Providing a setback in the design of dropped ceilings when they are required for the new use to allow for the full height of the window openings.

### Not Recommended

Installing new windows, including frames, sash, and muntin configuration that are incompatible with the building's historic appearance or obscure, damage, or destroy character-defining features.

Inserting new floors or furred-down ceilings which cut across the glazed areas of windows so that the exterior form and appearance of the windows are changed.

alternative is by far the most cost effective from a construction standpoint, with costs ranging from \$225 to \$335 per window from vendors included in Appendix I.

It is worth noting that several projects in Texas, which have been identified as part of this work, have foregone the double glazing of the windows for energy reasons. Examples include the Austin public Library,(new steel replacements); the San Antonio Arsenal (Rehabilitation) and projects in the Dallas Independent School System.

For this recommendation, all aspects of the specifications for Recommendation One and the sample specification attached as Appendix E should be reviewed and followed as appropriate.

## ALTERNATIVE TWO

The following alternative is not an "option" in the sense that it may be routinely adopted in lieu of the previous recommendations. This option does not meet the VA Construction Standard, and by reference, the Secretary Of Interior's Standards for Rehabilitation, until it has been demonstrated that the individual window involved is too deteriorated to save. Some flexibility, however, is often demonstrated in the evaluation of solutions when the overall qualities are maintained. While these points are technically correct, we recommend that our comments in the General Recommendations also be considered when reviewing the this option.

Where windows are too deteriorated to save, (No such windows were observed during the inspection.) Steel replacement windows may be ordered to match the existing windows. These windows may be ordered with double-glazing, or may be factored into a piggy-back, double window approach as outlined in the primary recommendation. Companies which can manufacture exact replacements are listed in Appendix I.

Of the companies listed in Appendix I, special note should be made of a replacement window available from the Optimum Window Company. The company has agreed to produce a custom replacement steel window to match the existing sight lines for all frames, muntins, rails and stiles. This window would be a true divided light, window, but with integral aluminum muntins. It would be double-glazed by the addition of an interior-single 3/8" polycarbonate sheet per sash.

This replacement sash design, which has been viewed by Center staff, seems to be the most acceptable replacement sash yet considered by the VA. While other steel companies have expressed an interest in the project, none has proposed this approach. Other steel companies might have the capability to produce similar solutions, but such design solutions should be explored between the prospective manufacturers and the project architect. One additional consideration might be whether the Optimum sash could be put in the existing frames, resulting in cost savings and retention of original material.

## ALTERNATIVE THREE

The fourth option is to be used when the VA has determined that none of the first three recommendations is feasible.

The use of this option to replace windows in sound structural condition, reparable by the techniques described in the primary recommendation and the draft specification presented as Appendix E, would be in violation of the VA Construction Standards. If, however, it is decided to remove the existing window, this option will, in some way, insure the retention of the visual qualities of the original windows, and hence the buildings.

Replacement windows could include a custom aluminum double-hung window, of the type tested at the VA Medical Center, Waco and found adequate to withstand the impact test. The window

should be fitted with the appropriate integral muntin grids, matching the configuration of the window being replaced. It is important to recognize that details count when specifying such a window. If the original window has 16 panes over 16 panes, it is not appropriate to take an "off the shelf" 9 over 9 or other configuration. Muntin grids would have to be integral to the frames and exterior to create the proper shadow lines. Sight lines should be maintained in any replacement. Frame profiles should match the original; do not allow the embellishment of profiles beyond the simple ones of the original windows. The size of the VA buildings is such that the costs of custom windows should be lowered to a reasonable figure. Perhaps having the window designed and manufactured to be incorporated into future projects would be feasible; this would eliminate inconsistency and lower costs.

### SITE CONSIDERATIONS

If the recommendations of this report are followed, there will be a mixture of new and original windows. The differences in detailing and configuration will result in inconsistencies in appearance within the facility. The only effective way to correct this would be to install a well designed, integral muntin grids over the existing new one-over-one windows. This is not an attractive option philosophically, but if the muntins met the following criteria, they would at least restore the visual qualities to the overall site.

- exterior applied
- simulated profile
- fitted to frame with tight, custom joints
- match original configuration and dimension

Such an option would have to be cleared with the reviewing authorities at the Texas Historical Commission, based on the retention of the remaining original windows. Informal discussions with the Commission indicate that they would consider this plan, if the VA retains and refurbishes the original windows in the remaining buildings as per the primary recommendation and alternative one. In our judgement, this would maintain the original visual qualities which have been lost in the replacements. The Secretary of the Interior's Standards require that repairs be based on accurate duplication of features, and that replacements match in composition, design, color, texture, and visual qualities. Most of these requirements could be met with this approach. In the event that alternative two is agreed to, the site issue would have to be negotiated with the Texas Historical Commission.

### INDIVIDUAL BUILDING CONSIDERATIONS

The VA is concerned about treatment recommendations for patient and non-patient buildings. The historic preservation concerns about maintaining original material, color and dimensions are such that the primary recommendation and alternative one apply to all buildings with one important distinction: Non-patient buildings (12, 15, 16, 19, 20 and 21) and perhaps building 4 (a support building) should not have a security or double window. To obtain double glazing on these buildings, a conventional interior storm window can be used at a much lower cost than using 3/8" lexan.

For alternatives two and three, they apply to all patient buildings (1, 4, 5, 6, 7, 8, 91, 93, 94). Individual design solutions for replacements should conform to the configuration, dimensions, color and other characteristics, i.e. the Optimum Window replacement design for the patient building may not be suitable for other non-patient or dissimilar buildings.

For buildings 15 and 16, located off the main campus loop road and plan, greater latitude should be allowed, e.g. alternative three. It should be noted, however, that the primary recommendation and alternative one are generally less expensive than alternative two or three.

## IX. FREQUENTLY ASKED QUESTIONS AND COMMENTS

### 1) "Existing steel windows are hard to open and close."

It is true that the existing windows are difficult to open and close. This is not due, however, to the window itself, but rather to the fact that the windows have been painted over so many times. In some cases 8 to 12 layers of paint were visible with the unaided eye (this means there may be more layers too thin to see). The paint has also been put in the jamb tracks and on the weatherstripping, even plugging up "weep" holes designed to let the window breathe. Also remember that when paint is put on both sides of a jamb, stop or weatherstripping, it has the effect of doubling the impact/thickness.

### 2) "Windows let in air and blowing rain, and cannot be closed."

We did observe this in the existing windows; however, it should be remembered that steel windows were machined to very close tolerances and anything which interferes with the opening or closing by blocking the movement may keep the window from sealing. All of the windows we observed had serious paint build-up and accumulation of dirt and debris. Both conditions prevent the units from closing properly, hence the leakage. The windows in the 1940s buildings are carefully detailed to seal properly including weatherstripping and overlapping meeting rails. They were, however, blocked up with debris and paint at the meeting rails and bottom corners.

### 3) "Spring balances are mostly failed and have lost their strength."

It is impossible to tell if balances have failed without going into the jamb. No one has done this since the balance pockets are covered with a metal plate which has been so overpainted it is often difficult to find. Flat metal tapes run down the stiles and are screwed in at the lower corners of each sash. The balances may appear to be broken or inadequate because the paint build-up is making it difficult or impossible to operate the sash. All of the windows we observed had their tape connectors in place. Balances appeared to be working even though they must overcome the resistance of the paint and dirt. Replacement balances are available from three sources listed in Appendix J.

### 4) "Steel windows have rusted out."

The rust on the windows is largely cosmetic, surface rusting. The windows are heavy gauge steel, possibly galvanized in some cases. The rust looks much worse than it actually is because it tends to stain the light colored paint. Most areas which have rust are caused by flaking paint, trapping moisture, accessories attached to the window (in some cases drilling through the sash or frame) or painted shut weep holes. Generally mild scraping revealed bare steel. The only areas found which are seriously rusted were the sills of the high bay, projected, crank-out windows in the kitchen area of building 4. In the overall context of the site or even Building 4, this is very minor and repairable.

### 5) "You can see through to the outside in some window frames."

There are places in Building 4 where, in the high bay projected windows, you can see daylight between the windows. This is not due to rusting however, it is due to old caulking. The windows are designed side by side with a flat steel plate (mullion) between units. The windows butt up against this mullion and then are caulked to seal the joint. The age of the failed caulking is unknown, but it is apparently quite old. Contemporary high performance sealants would correct the problem.



6) "The existing windows look like prison bars."

Generally detention windows have heavy vertical or horizontal bars where the glazed area is equal to or less than the structural area. From a distance, the windows in the VA in Waco resemble delicate wood muntins. A brief article which appeared in the September, 1928 issue of The Modern Hospital, commented on the Northport, Long Island VA Hospital, one of the hospitals in the architectural set having the same window configuration as the Waco Hospital, as follows: "One of the attractive features of the group of buildings is that there are no prison-like barred windows."

7) "The windows must be double glazed for energy conservation."

It is always desirable to conserve as much energy as possible. The windows are important in this regard. Double glazing is not required by the VA unless the outside design temperature is 25° or lower. The design temperature for Waco is 26°. The windows in the typical Waco building are the third largest load factor at 13.1%. Although it could be considered marginal, we believe it would be desirable to double glaze the windows at the VA Medical Center, not only from the standpoint of energy savings and reduced mechanical system size, but equally for patient/occupant comfort. A solution should be found which is also sensitive to the other requirements for security and maintaining historic material and appearance.

8) "Repair of the existing windows costs more than new windows."

The cost range of any construction project can vary widely as can the quality of the results. Actual costs of the new windows has ranged from \$789 to \$2,277 per window. Restoration estimates range from \$300 to \$2,400 (with the \$300 estimate covering the prime window only). If one doubles the \$300 estimate to accommodate a double glazing solution, it would still be at or below the cost of replacement windows.

9) "Windows at the VA must meet a variety of standards and requirements for energy, security maintenance, etc.."

This is true and it is appropriate. The VA Construction Standards CD-35 also require conformance to Rehabilitation Standards which require the retention of original material wherever possible. The buildings must be considered in their entirety. Total latitude has been given to modify the interiors as necessary to meet contemporary standards for delivery of health care services. There remains only the need to retain the exterior appearance and materials as the remaining expression of the original design. For a full discussion of why the VA Waco Medical Center is significant see the report, section III.

10) "It is very difficult to find contractors to repair/restore the windows properly."

It is true that the restoration of steel windows is a specialty, but it is also common to see several sub-contractors such as glazers metal workers and painters coordinated through proper specifications and scheduling to rehabilitate steel windows. There are traditionally many more companies which manufacture new windows than repair existing. The large number of building rehabilitation projects in the U.S. in the past few years, however, has resulted in many experienced contractors. A list of such resources is provided in the report, and the case studies also demonstrate that quality rehabilitation can be done with specialty contractors or by properly managing routine sub-contractors.

**APPENDIX C**

**EXECUTIVE ORDER 11593 DETERMINATION OF ELIGIBILITY**

**E.O. 11593**

**DETERMINATION OF ELIGIBILITY NOTIFICATION**  
**National Register of Historic Places**  
**Heritage Conservation and Recreation Service**

---

**Name of property:** Veterans Administration Medical Center

**Location:** Waco, McLennan County

**State:** TX

**Request submitted by:** VA Gjore J. Mollenhoff

**Date received:** 9/16/80

**Additional information received:**

---

**Opinion of the State Historic Preservation Officer:**

☒ **Eligible**

☐ **Not Eligible**

☐ **No Response**

**Comments:**

**The Secretary of the Interior has determined that this property is:**

☒ **Eligible**

**Applicable criteria:**

A,C

☐ **Not Eligible**

**Comments:**

**36 CFR Part 63.3**  
**Determination**

☐ **Documentation insufficient**

**(Please see accompanying sheet explaining additional materials required)**

*[Signature]*  
\_\_\_\_\_  
**Keeper of the National Register**

**Date:**

*10-23-80*

DETERMINATION OF ELIGIBILITY NOTIFICATION  
National Register of Historic Places  
Heritage Conservation and Recreation Service

**Additional information received:**

Comments:

**Comments:**

Date: 10-2-20



UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

**NATIONAL REGISTER OF HISTORIC PLACES  
INVENTORY - NOMINATION FORM**

FOR FEDERAL PROPERTIES

FOR NPS USE ONLY

RECEIVED

DATE ENTERED

SEE INSTRUCTIONS IN HOW TO COMPLETE NATIONAL REGISTER FORMS  
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

**1 NAME**

HISTORIC

AND/OR COMMON

VETERANS ADMINISTRATION MEDICAL CENTER

**2 LOCATION**

STREET & NUMBER

V. A. Medical Center

CITY, TOWN

Waco

VICINITY OF

NOT FOR PUBLICATION

CONGRESSIONAL DISTRICT

11

STATE

Texas

CODE  
48

COUNTY

Mc Lennan

CODE

309

**3 CLASSIFICATION**

**CATEGORY**

☒ DISTRICT

☐ BUILDING(S)

☐ STRUCTURE

☐ SITE

☐ OBJECT

**OWNERSHIP**

☒ PUBLIC

☐ PRIVATE

☐ BOTH

**PUBLIC ACQUISITION**

☐ IN PROCESS

☐ BEING CONSIDERED

**STATUS**

☒ OCCUPIED

☐ UNOCCUPIED

☐ WORK IN PROGRESS

**ACCESSIBLE**

☒ YES RESTRICTED

☐ YES UNRESTRICTED

☐ NO

**PRESENT USE**

☐ AGRICULTURE

☐ COMMERCIAL

☐ EDUCATIONAL

☐ ENTERTAINMENT

☒ GOVERNMENT

☐ INDUSTRIAL

☐ MILITARY

☐ MUSEUM

☐ PARK

☐ PRIVATE RESIDENCE

☐ RELIGIOUS

☐ SCIENTIFIC

☐ TRANSPORTATION

☐ OTHER

**4 AGENCY**

REGIONAL HEADQUARTERS (If applicable)

Veterans Administration

STREET & NUMBER

810 Vermont Avenue, N.W.

CITY, TOWN

Washington

VICINITY OF

STATE

D.C.

**5 LOCATION OF LEGAL DESCRIPTION**

COURTHOUSE

REGISTRY OF DEEDS, ETC

Land Management Service, VA Office of Construction

STREET & NUMBER

810 Vermont Avenue, N.W.

CITY, TOWN

Washington

STATE

D.C.

**6 REPRESENTATION IN EXISTING SURVEYS**

TITLE

VA Historic Sites Survey

DATE

Continuing

☒ FEDERAL ☐ STATE ☐ COUNTY ☐ LOCAL

DEPOSITORY FOR

SURVEY RECORDS

VA Historic Preservation Office

CITY, TOWN

Washington

STATE

D.C.

# 7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
<input type="checkbox"/> EXCELLENT	<input type="checkbox"/> DETERIORATED	<input type="checkbox"/> UNALTERED	<input checked="" type="checkbox"/> ORIGINAL SITE
<input checked="" type="checkbox"/> GOOD	<input type="checkbox"/> RUINS	<input checked="" type="checkbox"/> ALTERED	<input type="checkbox"/> MOVED      DATE _____
<input type="checkbox"/> FAIR	<input type="checkbox"/> UNEXPOSED		

## DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The historic district is a campus setting, comprising of many large medical buildings and auxiliary support buildings. Upon entering from the main road through massive gates, the largest building, a medical building, is straight ahead. To the right is a smaller administration building. Behind it are several quarters buildings. To the south (left-rear) of the main building, is a very large irregular oval roadway that is lined on either side with many other patient buildings, a recreation hall and dining facilities. The buildings form a large quadrangle in the center of the ellipse. To the northwest of the oval are the support and maintenance buildings.

A total of twenty-seven buildings were built between 1931 and 1935, followed by five more similar structures in 1945, by the Veterans Administration, from designs adapted from a prototype set of buildings. They included not only the main medical facility, but also a dining hall, recreation building, director's and duplex staff quarters, and assorted engineering, storage, laundry and maintenance shops. The set of buildings resembles many other V.A. Hospital stations in construction, functional layout, plan, elevations, and general approach to medical care design. Only the architectural styles differed according to the surrounding communities.

Waco was built in an Italian Renaissance Villa Style. All of the patient care buildings are shaped in a wide H. They are primarily two, three or four stories in height. The quarters and maintenance facilities shared common stylistic details with the larger patient buildings. The finish veneers are brick. The low pitched hip roofs are finished in clay tiles. Some entry pavilions are topped with pediments. Several wings have flat roofs crowned with parapets with a corbeled cornice. Other details include arcades, recessed arch panels, often with plain or arched windows, hip roofed towers or belvederes and arched doorways with fancy door surrounds. Significant restraint of line and ornament suggest the rectitude of Renaissance Revival.

# SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW			
<input type="checkbox"/> PREHISTORIC	<input type="checkbox"/> ARCHEOLOGY-PREHISTORIC	<input type="checkbox"/> COMMUNITY PLANNING	<input type="checkbox"/> LANDSCAPE ARCHITECTURE	<input type="checkbox"/> RELIGION
<input type="checkbox"/> 1400-1499	<input type="checkbox"/> ARCHEOLOGY-HISTORIC	<input type="checkbox"/> CONSERVATION	<input type="checkbox"/> LAW	<input type="checkbox"/> SCIENCE
<input type="checkbox"/> 1500-1599	<input type="checkbox"/> AGRICULTURE	<input type="checkbox"/> ECONOMICS	<input type="checkbox"/> LITERATURE	<input type="checkbox"/> SCULPTURE
<input type="checkbox"/> 1600-1699	<input checked="" type="checkbox"/> ARCHITECTURE	<input type="checkbox"/> EDUCATION	<input type="checkbox"/> MILITARY	<input checked="" type="checkbox"/> SOCIAL/HUMANITARIAN
<input type="checkbox"/> 1700-1799	<input type="checkbox"/> ART	<input type="checkbox"/> ENGINEERING	<input type="checkbox"/> MUSIC	<input type="checkbox"/> THEATER
<input type="checkbox"/> 1800-1899	<input type="checkbox"/> COMMERCE	<input type="checkbox"/> EXPLORATION SETTLEMENT	<input type="checkbox"/> PHILOSOPHY	<input type="checkbox"/> TRANSPORTATION
<input checked="" type="checkbox"/> 1900	<input type="checkbox"/> COMMUNICATIONS	<input type="checkbox"/> INDUSTRY	<input checked="" type="checkbox"/> POLITICS/GOVERNMENT	<input type="checkbox"/> OTHER (SPECIFY)
		<input type="checkbox"/> INVENTION		

SPECIFIC DATES

BUILDER/ARCHITECT

## STATEMENT OF SIGNIFICANCE

This medical center is part of a set of hospitals in VA ownership which form a thematic group illustrative of a major concept in the delivery of health care, specifically to veterans. Hospitals in the set may be found in almost every state and include a wide variety of architectural styles or facades used with the same structural design for buildings intended to serve the same or similar functions.

The Veterans Bureau was established by Executive Order in 1921. The first Director of the Bureau, appointed by President Harding was Charles R. Forbes, formerly Director of the War Risk Insurance Bureau. At the time the Veterans Bureau was established World War I veterans were receiving medical care and examinations for pensions or compensation and other health related benefits in a conglomeration of Public Health Service, military, contract, leased and Veterans Bureau (former military and Public Health Service) hospitals.

During his initial inspection tour of facilities Forbes was appalled at the "deplorable, absolutely deplorable" conditions in "many cantonments" which he characterized as "all fire hazards," and "wooden shacks."

A second immediate problem faced by Forbes, in his view, was the insistence of Dr. Charles E. Sawyer, President Harding's personal physician that all classes of Veterans Bureau patients, general medical and surgical, neuro-psychiatric, and tuberculosis, be housed together.

With the appropriation of acquisition and construction funds the Bureau, under Forbes' leadership, initiated the beginnings of a massive new construction program to replace the firetraps Forbes deplored. The construction provided for what would become prototype buildings for the categories of patients for whom Forbes felt segregation was appropriate.

The use of "standard" designs by the Veterans Bureau-Veterans Administration was not a new concept in government. But, the manner in which "standard" designs were used for the architectural set of hospitals was a new direction in the use of "standard" designs.

UNITED STATES DEPARTMENT OF THE INTERIOR  
NATIONAL PARK SERVICE

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The military has used standard designs for barracks, quarters and other facilities at least since the last quarter of the 19th Century when scattered garrisons and frontier outposts were replaced by concentrations of troops into large, permanent posts, usually at railheads. There are variations in the use of standard designs. These appear to be based upon the availability of specified building materials and local preference rather than any high level policy decision on design variations.

In the architectural set of VA hospitals the stylistic variations were approved at the highest levels of the agency and therefore reflect a conscious design policy. The distribution of the various styles across the country reflects some organized concept of local history, local architectural preferences and an effort to "fit in" and appear as a part of the host community.

"Since the beginning of the century a great advance has been made in the diagnosis and treatment of patients suffering with one or more of the many classifications of mental diseases. As a result of World War I the opportunity presented itself for a great amount of research and development. Throughout this period an attempt has been made by the Veterans Administration to have the physical arrangement of its hospitals afford the doctor every opportunity to further this work.

"Because of the size of VA neuropsychiatric hospitals, it has been possible in most cases to design one or more buildings for the exclusive care of each type of patient thus permitting assignemnt of duties, recreation, etc., possible of accomplishment by each type of patient together with such specialized treatment as is required. As the treatment buildings are described, therefore, it will be understood that in a smaller hospital consolidation of two or more of these activities might with careful study be possible under one roof."

In lay terms neuro-psychiatric hospitals, based upon the bed levels established, required a certain number of "hospital" beds in relation to controlled access buildings, intermediate stage buildings and low security buildings. Medical and surgical patients required a mix of acute (serious condition) versus convalescent buildings, while the treatment of TB required more long term buildings and no security. These were supplemented by the appropriate administrative buildings, dining halls and other support facilities such as recreation halls, chapels, engineering shops, boiler plants and staff housing. The actual structure for each type of building, down to the floor plans for stairways and elevators was standardized. However the facade or exterior



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architectural treatment of each hospital ranged from minor variations based upon the Georgian Colonial theme to such wide variations as English Tudor, Spanish Renaissance or French Colonial.

While these prototypes were not used exclusively by the Veterans Bureau and its successor agency, the Veterans Administration, they were the dominant design concept used through the end of World War II.

While the original, standard interior plans of the Architectural Set of VA hospitals is the initial basis of its significance, only the exterior interpretation of that plan is presently significant.

Since these medical centers were originally constructed (between the early 1920's and the immediate Post World War II period) the interiors have been renovated and remodeled repeatedly.

The hospital buildings originally had multiple-bed wards, large day rooms and porches. Health care concepts, life-safety codes for institutional occupancy and the standards of the Joint Committee on the Accreditation of Hospitals (JCAH) have undergone a constant evolution. As a result the interiors of these buildings have been altered frequently to meet each of these changing requirements. Rather than large wards, patient rooms are now most often a mix of 4 or 6 bed wards, 2 bed rooms and single bed rooms.

The changes in space criteria per bed in each of these configurations have meant porches were enclosed to provide additional space and prevent a loss of beds. As buildings have been air conditioned, it has been possible to enclose additional porches to provide additional space needs without the costs of new construction.

As a result of these repeated changes to the interiors of the buildings the original fiber and significance of the interiors no longer exists.

It is not surprising that the use of standard designs for hospitals would continue for a quarter of a century. At the time the nation began to meet the need for veterans hospital facilities after World War I the construction of all federal buildings was under the jurisdiction of the Supervising Architect in the Department of the Treasury. The First Langley Bill had authorized construction of veterans hospitals by Treasury. Planning assistance came from the Armed Services and former members of the services. Construction for a number of hospitals was underway when the Veterans Bureau was created.

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in 1921. Existing U.S. Public Health Service Veterans Hospitals were transferred to the new Bureau by one Executive Order, while a second directed the transfer of the First Langley Bill hospitals when completed.

The Second Langley Bill, passed after the creation of the Veterans Bureau gave the Bureau the direct authority to construct veterans hospitals. At this time key personnel associated with the planning of the First Langley Bill hospitals transferred to the new Bureau, forming the core of the Bureau's construction service.

The Veterans Bureau under Charles R. Forbes was plagued by the same reports of scandal, corruption and cronyism as the Harding Administration. Charges ranged from outright bribery and collusion in the selection of hospital sites to kickbacks for contracts, bootlegging of federally held liquor stocks and improper disposal of reputedly surplus medical supplies to veiled suggestions of personal improprieties on official travel.

Charles Forbes' resignation from the Veterans Bureau on February 15, 1923, was followed almost immediately by a Congressional resolution for an investigation into the operations of the Bureau and the suicide March 16th of his handpicked General Counsel, Charles F. Cramer. Following the Congressional investigation, Forbes was convicted for his role in the scandals that occurred under his administration, ending the blackest era of the VA history.

Forbes was replaced as Director of the Veterans Bureau by General Frank T. Hines, a World War I veteran of impeccable reputation. Hines remained as Director of the Veterans Bureau until the creation of the Veterans Administration in 1930 when he became the first Administrator of Veterans Affairs. He served in that capacity through the end of World War II when a new, and much larger body of veterans pressed for the replacement of the World War I cadre of leadership within the agency by representatives of "their" war. Hines was then replaced by "The G.I. General" Omar Bradley.

The career architects and engineers of the Bureau's construction service were never involved in any way in the Forbes scandals. Many of them remained with the Bureau and the new VA through the end of General Hines tenure, continuing to construct veterans hospitals according to the plans and care concepts they had originally developed in the early 1920's.

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But the era of Charles Forbes left two legacies still a major part of the VA health care delivery program: an abiding concern for the safety of VA patients from fire and other life threatening dangers and separate facilities designed for the specific needs of general medical and surgical or neuro-psychiatric patients. Thanks to VA research the need for separate TB facilities was obviated through drug therapy during the 1950's.

The original appearance for each hospital location was a campus arrangement of buildings. The design for each campus was based upon the size and topography of the individual parcel of property and the number of the various structures required to meet the bed numbers and distribution for the individual hospital complex.

The selection of sites for veterans hospitals during this period was based upon a number of factors. The most important included:

Demographics - The nationwide distribution of eligible veterans in need of care and the type of care needed compared to the availability of existing beds.

Type of Facility - General siting policy at this time called for the location of neuro-psychiatric and TB hospitals (long term care facilities) on large tracts of land away from major urban centers. General medical and surgical hospitals (acute care facilities) were to be located in or near major urban centers on less extensive parcels of land.

Availability of Federal Lands - The transfer of existing federal lands between agencies and the transfer of facilities with structures suitable for or adaptable to medical care use avoided acquisition and some construction costs. The transfer of military posts, slated for abandonment in the post World War I period, retained a federal presence in the areas and avoided the otherwise severe economic impacts on the local communities.

Local Initiatives - Local communities, state governments and citizens' organizations supported requests for the location of a veterans hospital in a specific location with offers to donate land, funds, existing facilities or facilities under construction.

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Continued Treatment Building

Housing for able-bodied patients with chronic conditions or a degree of recovery for which restriction and observation are still required. Patients in this category took meals in the main dining hall building and participated in the occupational therapy program.

Parole Building

Patients housed in this type of facility were sufficiently recovered physically and mentally to care for themselves with nominal supervision. Parole patients not only took meals in the Dining Hall Building but had access to the Recreation Building.

Dining Hall Building

The dining hall contained not only dining rooms but kitchens, facilities for refrigeration, food preparation and storage for subsistence supplies.

Recreation Building

The recreation usually contained a lounge for cards, billiards and other games, an auditorium and library.

Residential & Quarters Buildings

The residential and quarters buildings included a single family dwelling for the Director (then called the Manager), two duplex units for key staff and their families and the appropriate number of non-housekeeping or dormitory living units for nurses and attendants.

Utility Group

Composed of the boiler house, laundry, storehouse, garage, shops, firehouse (if applicable) and farm buildings.

Connecting Corridors

The use of connecting corridors between buildings served two functions; patient control and the movement of patients and staff throughout the complex in adverse weather.



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Political Sensitivity - As with other federal agencies, the Bureau did, on occasion, select a specific site within the home states or home communities of prominent political leaders.

Other factors which determined the selection of specific land parcels included the suitability of the land for construction, a healthful environment and/or climate, the availability of water and utilities and proximity to regularly scheduled public transportation.

NP BUILDING TYPES

Main Hospital Building

A main administrative and clinical building usually four or five stories including about 200 hospital beds each. Additional capacity is provided in two story ward buildings of 100 to 200 beds each.

The main building provides the medical and surgical center for the hospital. It includes medical administrative space, operating suite, receiving ward and clinics. Basically the Main Building is a combination of the np features necessary for the treatment, protection and safety of patients and all of the facilities for a general medical hospital.

Acute Building

Designed for the care and treatment of patients disturbed to such an extent that they require intensive treatment or that they may be dangerous to themselves or others. The purpose was two fold; to provide specialized treatment and to keep these patients segregated from the less seriously ill.

Infirmary Building

Designated for patients suffering from physical deterioration as well as np disabilities and capable of doing little or nothing toward their own care. Composed of mostly bedridden patients requiring close supervision and constant care, these facilities included dining rooms and kitchens within the building.

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**GENERAL MEDICAL & SURGICAL BUILDING TYPES**

For individual hospital complexes see individual Building Plot and  
Locator Plan (VA document).

For building descriptions see individual data sheets.

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WACO, TEXAS

<u>BLDG.</u>	<u>DATE</u>	<u>USE</u>
1	1932	General Medical
2	1932	Administration
4	1932	Dining Hall
5	1931	Ambulatory Care
6	1932	Recreation Building
7	1932	Psychiatric
8	1932	Nursing Home Care & Canteen Service
9	1935	General Medical
10	1935	Psychiatric
11	1935	General Medical
12	1931	Admin. Offices & Mem. Emp. Quarters
14	1931 Intrusion	Boiler House
15	1931	Storehouse
16	1932	Station Garage
17	1931	Laundry
18	1932	Day Treatment Center & Mental Hyg. Clinic
19	1932	Director's Quarters
20	1932	Duplex Quarters
21	1932	Duplex Quarters
24	1936	Engineer Offices & Shops
25	1932 Intrusion	Valve House
26		Radial Brick Chimney
27	1932	Water Softener - Salt House
28	1932 Intrusion	Steel Water Tank & Tower
29	1932	Gas Meter House
30		Flag Pole
32	1932 Intrusion	Five Car Garage
33	1932 Intrusion	One Car Garage
34	1932 Intrusion	Two Car Garage
35	1932 Intrusion	Two Car Garage
36	Intrusion	Water Valve Pit
T-51	Intrusion	Greenhouse -
68	Intrusion	Acid Feed Water Plant
90	1945	General Medical
91	1945	General Medical

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92	1943	Psychiatric
93	1945	Psychiatric
94	1945	Dental & Spec. Med. Prog.
T-98	1946	Intrusion Warehouse
T-99	1946	Intrusion O.T. Woodworking Shop
T-100	1947	Intrusion Eng. Storage - Paint
T-101	1947	Intrusion Eng. Storage - Labor & Bldg. Matl.
T-102	1947	Intrusion Eng. Elec. Fix. & Gardener
T-103	1946	Intrusion Eng. Storage - Mason & Plasterer
T-104	1947	Intrusion Eng. Storage - Plumbing Fixtures and Matl.
T-105		Intrusion M.A.T. Storage - Lumber
T-106	1947	Intrusion M.A.T. Storage - Lumber
T-107	1946	Intrusion M.A.T. Supply Storage
T-108	1946	Intrusion M.A.T. P.M.&R.S. Storage
T-109	1947	Intrusion Linen Supply
T-110	1947	Intrusion M.A.T. Office & Class Room
T-111	1946	Intrusion M.A.T. Machine Shop Clinic
T-112	1946	Intrusion M.A.T. Automotive & Plastic Shop
T-113	1946	Intrusion Storage
115	1955	Intrusion Boiler House Storage
117	1948	Intrusion Storage
T-127		Intrusion Transformer Vault
128		Intrusion Bus Station
129	1964	Intrusion Chapel
130	1967	Intrusion Reservoir
131		Intrusion Pump House
132	1965	Intrusion Transformer
133	1972	Intrusion Switchgear & Transformer Bldg.
134	1973	Intrusion Cooling Tower Structure
135	1973	Intrusion Cooling Tower Structure
136	1973	Intrusion Cooling Tower Structure
137	1973	Intrusion Cooling Tower Structure
138	1973	Intrusion Cooling Tower Structure
139	1973	Intrusion Cooling Tower Structure
140	1973	Intrusion Cooling Tower Structure
141		Intrusion Cooling Tower Structure
142	1973	Intrusion Cooling Tower Structure
143	1973	Intrusion Cooling Tower Structure
144	1973	Intrusion Cooling Tower Structure
145	1973	Intrusion Cooling Tower Structure
146		Intrusion Transformer
147		Intrusion Transformer



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148	Intrusion	Transformer
149	Intrusion	Transformer
150	Intrusion	Transformer
151	Intrusion	Transformer
152	Intrusion	Transformer
153	Intrusion	Transformer
154	Intrusion	Transformer
155	Intrusion	Transformer
156	Intrusion	Transformer
157	1972 Intrusion	Transformer
158	Intrusion	Transformer
159	Intrusion	Transformer
160	Intrusion	Transformer
161	Intrusion	Cooling Tower
162	Intrusion	Transformer
163	Intrusion	Cooling Tower
164	Intrusion	Transformer
165	Intrusion	Emergency Generator Shelter
166	Intrusion	Oxygen Storage
167	1978 Intrusion	Greenhouse
168	Intrusion	Transformer
169	Intrusion	Cooling Tower
170	Intrusion	Cooling Tower
171	Intrusion	Covered Pavilion
172	Intrusion	Covered Pavilion
173	Intrusion	Covered Pavilion
174	Intrusion	Covered Pavilion
175	Intrusion	Covered Pavilion
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183	Intrusion	Covered Pavilion
184	Intrusion	Covered Pavilion
185	Intrusion	Covered Pavilion
186	Intrusion	Covered Pavilion
187	Intrusion	Covered Pavilion
188	Intrusion	Covered Pavilion
189	Intrusion	Outdoor Toilet

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T-90	Intrusion	Job Shack
191	Intrusion	Restroom & Storage
192	Intrusion	Bleachers
195	1979 Intrusion	Generator

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VA ARCHITECTURAL SET OF HOSPITALS

VA Medical Center	State	Style	Date
Alexandria	Louisiana	French Colonial	1929
Allen Park	Michigan	Georgian Colonial	1938
Amarillo	Texas	Spanish Colonial	1939
American Lake	Washington	Spanish	1923
Batavia	New York	Georgian Colonial	1932
Bath	New York	Georgian Colonial	1939
Battle Creek	Michigan	Georgian Colonial	1924
Bay Pines	Florida	Spanish Renaissance	1924
Bedford	Massachusetts	Georgian Colonial	1928
Biloxi	Mississippi	Southern Colonial	1932
*(Biloxi Division)			
Biloxi	Mississippi	Spanish Baroque	1923
(Gulfport Division)			
Cleveland	Ohio	Georgian Colonial	
(Brecksville Division)			
Canandaigua	New York	English Tudor	1932
Chillicothe	Ohio	Georgian Colonial	1923
Coatesville	Pennsylvania	Georgian Colonial	1930
Columbia	South Carolina	Georgian Colonial	1932
Des Moines	Iowa	Georgian Colonial	1933
Fayetteville	Arkansas	Georgian Colonial	1933
Fayetteville	North Carolina	Georgian Colonial	1939
Fort Lyon	Colorado	Georgian Colonial	1932
*Fort Howard	Maryland	Georgian Colonial	1943
Hampton	Virginia	Georgian Colonial	1937
Huntington	West Virginia	Georgian Colonial	1932
Indianapolis	Indiana	Georgian Colonial	1931
(Cold Springs Road Division)			
Lebanon	Pennsylvania	Georgian Colonial	1947
Lexington	Kentucky	Georgian Colonial	1930
(Leestown Division)			
*Lincoln	Nebraska	Georgian Colonial	1929
Lyons	New Jersey	Georgian Colonial	1929
Marion	Illinois	Egyptian Revival	1940
Montgomery	Alabama	Georgian Colonial	1939
Montrose	New York	Georgian Colonial	1949
Murfreesboro	Tennessee	Georgian Colonial	1939
Newington	Connecticut	Georgian Colonial	1930
North Little Rock	Arkansas		
Northampton	Massachusetts	Georgian Colonial	1923

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Northport	New York		1927
Pittsburgh (Aspinwall Division)	Pennsylvania	Georgian Colonial	1925
Roseburg	Oregon	Georgian Colonial	1933
Salem	Virginia	Georgian Colonial	1933
San Francisco	California	Modern	1934
St. Cloud	Minnesota	Georgian Colonial	1923
Tomah	Wisconsin	Georgian Colonial	1946
Tuscaloosa	Alabama	Georgian Colonial	1931
Waco	Texas	Italian Renaissance	1932
West Roxbury	Massachusetts	Georgian Colonial	1943
White River Junction	Vermont	Georgian Colonial	1938
Wichita	Kansas	Georgian Colonial	1933

\*Interior has Determined This Property Eligible for the National Register, as part of the Architectural Set.














## 10




ACREAGE OF NOMINATED PROPERTY 125.32

### UTM REFERENCES

A     
ZONE EASTING NORTHING

C   

B     
ZONE EASTING NORTHING

D   

**VERBAL BOUNDARY DESCRIPTION**

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

**CODE**

**CODE**

## 11

NAME	TITLE
Gjore J. Mollenhoff	
Karen R. Tupek	

VA Historic Preservation Officer  
Architect

ORGANIZATION: Sandra Webb  
Veterans Administration

Program Analyst DATE

April 4, 1980

STREET &amp; NUMBER

TELEPHONE

810 Vermont Avenue, N.W.

389-3447

CITY OR TOWN

STATE

Washington

D.C.

## 12

### STATE HISTORIC PRESERVATION OFFICER RECOMMENDATION

**YES**\_\_\_\_\_

NO\_\_\_\_\_

NONE

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

In compliance with Executive Order 11593, I hereby nominate this property to the National Register, certifying that the State Historic Preservation Officer has been allowed 90 days in which to present the nomination to the State Review Board and to evaluate its significance. The evaluated level of significance is \_\_\_\_\_ National \_\_\_\_\_ State \_\_\_\_\_ Local

FEDERAL REPRESENTATIVE SIGNATURE

**TITLE**

DATE \_\_\_\_\_

**FOR NPS USE ONLY**

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE \_\_\_\_\_

DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION  
ATTEST

DATE \_\_\_\_\_

KEEPER OF THE NATIONAL REGISTER

**APPENDIX D**

**ARCHITECT'S CHECKLIST FOR REHABILITATION PROJECTS**

**(FROM ARCHITECTURAL GRAPHIC STANDARDS)**

## INTRODUCTION

The following checklist is intended to suggest the range of preservation factors an architect should consider during the course of rehabilitating historic buildings. It is not exhaustive, and some factors will not apply to all structures or preservation projects.

## CHECK HISTORIC DESIGNATION AND AVAILABLE DOCUMENTATION

Is the building a local landmark or located in a locally designated historic district?

Is it in a historic district that is listed in the National Register of Historic Places? Does it contribute to the historic significance of that district?

Is it individually listed in the National Register of Historic Places?

What historical or architectural documentation is available about the building(s) or site? For example:

- National Register nominations
- recorded by Historic American Buildings Survey/Historic American Engineering Record
- state or local historical survey or inventory
- local documents, views, photographs in libraries, archives, historical societies

## CHECK LEGAL REQUIREMENTS

Are there already easements or local ordinances governing alterations to property (deed records, zoning offices)?

How do the state and local building codes apply to your historic structure? What impact will they have upon the character and integrity of the building? Are code variances available? Are there code equivalency possibilities for your particular building?

Will there be federal funds involved in the project which will require review by the State Historic Preservation Office and consultation with the Advisory Council on Historic Preservation? Will federal investment tax credits be used? If so, are you familiar with the *Secretary of the Interior's Standards for Rehabilitation and Guidelines for Rehabilitating Historic Buildings* as well as the National Park Service certification procedures Chapter 1, Title 36 of the Code of Federal Regulations, Part 67? Have you obtained a copy of the Historic Preservation Certification application form from the State Historic Preservation Officer?

- Note that for federal investment tax credits, the Secretary's Standards take precedence over local requirements.

## EVALUATE HISTORIC CHARACTER/SIGNIFICANCE OF STRUCTURE

Have you identified, listed, and prioritized the character-defining aspects of the building? These may include its form, materials, workmanship, features, color, relationship of solids to voids, and interior spaces—all those physical features or tangible aspects of the building that define its historic character.

## OTHER SOURCES OF TECHNICAL PRESERVATION INFORMATION

### PRESERVATION ASSISTANCE DIVISION

National Park Service  
P.O. Box 37127  
Washington, DC 20013-7127

The Preservation Assistance Division has developed numerous technical publications on preserving and rehabilitating historic buildings. These publications are available from the Superintendent of Documents, Government Printing Office, Washington, DC 20402.

### NATIONAL PARK SERVICE REGIONAL OFFICES NATIONAL REGISTER PROGRAMS

Cultural Resources Division  
Alaska Regional Office, National Park Service  
525 Gambell Street, Room 107  
Anchorage, AL 99503

Preservation Services Division  
Mid-Atlantic Regional Office, National Park Service  
100 Arch Street, Room 9414  
Philadelphia, PA 19106

Lee H. Nelson, FAIA, Preservation Assistance Division, National Park Service, Washington, D.C.

Some original features may not be important contributors to the historic character and some will be all important. For example, a brick building may have been painted at an early date and its painted appearance may be an important aspect of its historic character.

What have been the architectural changes over time? These may include:

- new additions
- changes to surfaces and finishes (slates to asphalt, polychrome to monochrome)
- blocking of windows
- changes to grade
- loss of cornice
- false fronts
- changes to basic plan (single family to multiple family).

Are any of the changes significant and worth preserving or do they detract from the building?

Has the architectural integrity of the building and its setting been assessed? Architectural integrity means the intactness of the building as an architectural system (its plan, features, materials, finishes, structural system, and the presence of architectural features).

## ASSESS PHYSICAL CONDITION

Are there gross physical problems that threaten the building's architectural and structural integrity?

Has a structural survey been performed to determine deficiencies due to settlement, deflection of beams, seismic inadequacy, and cuts through structural members for mechanical pipes and ducts?

Are there inherent materials damage, such as materials failure due to poor original design, poor original materials, severe environmental or moisture problems, neglect, improper maintenance, etc.?

Is there man-inflicted damage, such as ornamentation removed, inappropriate coatings, bad repointing or cleaning, insensitive additions, or partitioning of significant interior spaces?

Are historic features hidden behind later alterations? These may include ornamental ceilings or cornices hidden above dropped ceilings.

## DEVELOP PRESERVATION PROJECT PLANS

Will it be necessary to write unique specifications rather than use standard specifications to apply to work performed on a historic building?

Will testing be needed to determine the performance of the materials or the systems? Note that it may be necessary to review test results with consultants or laboratories.

Will the project involve hard-to-find replacement materials such as terra-cotta or ornamental metals that may require critical path logistical planning?

Will the project involve hard-to-find crafts such as stone carving or ornamental plastering, and if so, can the necessary expertise be found?

Division of Cultural Resources  
Rocky Mountain Regional Office, National Park Service  
12795 West Alameda Parkway  
P.O. Box 25287  
Lakewood, CO 80225  
Preservation Services Division  
Southeast Regional Office, National Park Service  
75 Spring Street, SW  
Atlanta, GA 30303  
National Register Programs  
Western Regional Office, National Park Service  
450 Golden Gate Avenue  
P.O. Box 36063  
San Francisco, CA 94102

### STATE HISTORIC PRESERVATION OFFICERS

For the name and address of the state historic preservation officer in your state, contact:

Can samples or models be made available to establish the standard of craftsmanship for the project?

Will the project involve energy conservation measures? Have measures been chosen that retain historic materials and finishes to the maximum extent possible?

Will new uses require upgrading the live loading capacity of wooden floor joists? How do the preservation objectives affect the decision making? For instance, it is better to double up existing joists with a parallel member than

Will new uses require upgrading the live loading capacity of wooden floor joists? How do the preservation objectives affect the decision making? For instance, it is better to double up existing joists with a parallel member than to remove historic materials, and if an ornamental ceiling would be damaged by this approach, a structural engineer should investigate other alternatives.

Has the impact of new additions and adjacent new construction been minimized by keeping the size, shape, materials, and detailing in scale with the surrounding environment?

What protective measures will be taken to preserve important character-defining features and finishes during the construction work?

On the exterior, will the rehabilitation work cause loss of significant historic fabric or seriously damage the historic character? Loss of historic fabric or change of historic character often occur when:

- storefronts are altered
- visible skylights are added to a roof
- new dormers are added on prominent roofs
- whole new floors are added on top of an existing building
- porches are enclosed
- new window openings are created
- tinted films or reflective coatings are added to windows
- new window sash are historically inappropriate as to configuration and detailing.

On the interior, will the rehabilitation cause loss of significant historic fabric or seriously damage the historic character? Loss of fabric or change of character often occur when:

- interiors are partitioned and there is a loss of significant sequence of spaces
- interior plaster is removed to expose brickwork
- interiors are gutted, as might occur to introduce new atriums, new floor levels, or to reconfigure spaces
- significant stairs are removed or altered.

Will there be a professional on site during construction to ensure that work is carried out according to established preservation principles?

Have construction personnel received adequate training in undertaking historic preservation work?

## CREDITS FOR PRESERVATION SECTION

This section was prepared by the following staff of the Preservation Assistance Division, National Park Service: Lee H. Nelson, FAIA; H. Ward Jandl, Michael J. Auer; Charles E. Fisher; Anne Grimmer; Camille Martone; Sharon C. Park, AIA; and Kay D. Weeks.

### National Conference of State Historic Preservation Officers

Hall of the States  
444 N. Capitol Street, NW, Suite 332  
Washington, DC 20001

AIA State Preservation Coordinators  
Call the Historic Resources Committee Staff Director at the AIA Headquarters to make contact with the AIA state preservation coordinator.

The Association for Preservation Technology  
P.O. Box 2487, Station D  
Ottawa, Ontario  
Canada K1P 5W6

National Trust for Historic Preservation  
1785 Massachusetts Avenue, NW  
Washington, DC 20036

The Old-House Journal  
69A Seventh Avenue  
Brooklyn, NY 11217

**APPENDIX E**

**DEPARTMENT OF VETERANS' AFFAIRS CONSTRUCTION STANDARDS CD-35**



November 27, 1985

## WINDOWS, EXTERIOR

### 1. CODE

Comply with the latest edition of NFPA Standard No. 101, "Life Safety Code."

### 2. HISTORIC BUILDINGS

Projects effecting windows of historic buildings shall conform with the Secretary of the Interior's "Standard for Rehabilitation and Guidelines for Rehabilitating Historic Buildings." Copies of this booklet are available from the Historic Preservation Office (08A1).

### 3. ENERGY CONSERVATION

a. Design windows and glass ratio in accordance with VA Construction Standard 31-1, "Building Envelope Energy Conservation Design."

b. For double-glazed windows, provide a continuous thermal break between inner and outer sash; also, between inner and outer frame components.

c. Where double-glazed windows are used, horizontal venetian blinds shall be enclosed between the two glazed surfaces wherever the type of window will accommodate this feature.

### 4. OPERABILITY

a. All windows shall be operable so that both sides can be washed and glazed from within the building. Unless historic design compatibility or other specific conditions dictate otherwise, in-swinging side-hinged windows are preferred in air conditioned buildings. This does not apply to boiler houses nor to animal research laboratory buildings.

b. When in open position for ventilation, window sash shall not project into the room beyond edge of sill stool or face of convactor, nor beyond exterior reveals of window sills within 6'-6" of grade.

c. Mechanically operated windows shall be avoided. If they are necessary for high, clerestory, monitor or other inaccessible windows, then the mechanical operators shall be simple and durable.

### 5. SAFETY GLAZING

a. Provide laminated glass for all windows in Psychiatric Nursing Units, Alcohol Dependency Treatment Nursing Units, Drug Abuse Treatment Nursing Units and MS&N Security Bedrooms. Laminated glass shall be 7/16" thick in locked patient units and security rooms, 5/16" thick elsewhere. - OUTSIDE, USE 1/4" TEMPERED

b. If laminated glass is required for double-glazed windows, provide it for interior panes only.

RESCISSION: VA Construction Standard CD-35, dated May 14, 1979.



for ALBERT A. PETER, JR.  
Director, Office of Construction

Distribution: RPC: 0830  
FD

Printing Date: 12/85

**APPENDIX F**

**LIST OF PRESERVATION TECH NOTES ON STEEL WINDOWS**

## LIST OF PRESERVATION TECH NOTES ON STEEL WINDOWS

Fisher, Charles E., "Preservation Tech Notes: #2, Installing Insulating Glass in Existing Steel Windows", US Department of the Interior, 1984.

\_\_\_\_\_, "Preservation Tech Notes: #15, Interior Storms for Steel Casement Windows", US Department of the Interior, 1986.

Park, Sharon C., "Preservation Briefs: #13, The Repair and Therman Upgrading of Historic Steel Windows", US Department of the Interior, 1986.

Powers, Robert M., "Preservation Tech Notes: #17, Repair and Retrofitting Industrial Steel Windows", US Department of the Interior, 1989.

**APPENDIX G**

**DEPARTMENT OF VETERANS' AFFAIRS CONSTRUCTION STANDARD 31-1**



October 4, 1988

## BUILDING ENVELOPE ENERGY CONSERVATION DESIGN

### 1. PURPOSE

This standard establishes minimum policy requirements for thermal loss and gain through exterior envelopes of new VA buildings. Buildings provided with both heating and cooling systems shall be designed in accordance with the requirements prescribed in this standard.

### 2. DEFINITION

Building envelope refers to building elements which enclose conditioned spaces and through which thermal energy is transmitted to or from the outdoors. A building envelope includes exterior walls, windows, exterior doors, roof/ceilings, peripheral edges of floors over heated spaces, floors over unheated spaces, slab-on-grade floors, and foundation walls.

### 3. SCOPE

The VA buildings to be included in the application of this construction standard shall be governed by Section 2.0, "Scope," of ASHRAE Standard 90, Energy Conservation in New Building Design. In general, the requirements of this VA construction standard do not apply to boiler plant or chiller plant buildings.

### 4. STANDARD

a. The design of building envelopes shall comply with criteria for thermal loss and gain stated in the latest edition of ASHRAE Standard 90, Section 4.0, "Exterior Envelope." In applying ASHRAE Standard 90, the VA has determined that the following limits shall be used:

(1) Double glazed windows with continuous thermal break shall be used where the outdoor heating design temperature is 25° F dry bulb or lower to prevent condensation on window glass at the 72° F dry bulb 30 percent relative humidity inside design temperature (see VA Construction Standard CD-35).

(2) Service Bay and Service Zone (Interstitial Level) exterior wall areas shall not be used in the calculation of the overall thermal transmittance ( $U_o$ ), but shall have the same wall thermal transmittance as other exterior opaque wall areas.

b. Perimeter insulation shall be provided inside of foundation walls for concrete floor slabs on grade so that the slabs will be thermally isolated from the foundation walls. Provide underfloor insulation for comfort throughout patient sleeping areas having concrete floor slabs on grade. Perimeter and underfloor insulation shall be equivalent to closed cellular type for moisture resistance.

RESCISSION: VA Construction Standard 31-1, dated May 16, 1985.



G.E. NEUMANN  
Director, Office of Facilities

Distribution: RPC: 0830  
FD

Printing Date: 10/88

**APPENDIX H**

**TWO DRAFT SPECIFICATIONS FOR REHABILITATION OF STEEL WINDOWS**

## STEEL WINDOW RESTORATION/RENOVATION SPECIFICATIONS

### I. PREPARATION

- A. Hand tool cleaning including removal of loose rust, loose mil scale and loose paint to degree specified, by hand chipping, scraping, sanding, and wire brushing.
- B. Solvent cleaning including removal of oil, grease, dirt, soil, salts, and contaminants by cleaning with solvent, vapor, alkali, emulsifying agent, or steam.
- C. Removal of all deteriorated mortar around channel iron and glazing from glass and metal stops.

### II. REPAIR

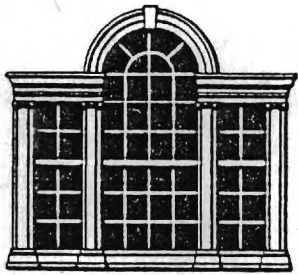
- A. Replace all deteriorated metal parts where structural strength of unit is affected or weather tightness is a factor. All replacement pieces should be of approximate size and shape of original. Use of duplicate materials from salvaged units is strongly suggested. Spot welding of replacement parts and removal of slag is required.
- B. All glass is to be replaced using clear glass specified by architect. (DSB or 1/4" strength)
- C. Replace portland based mortar around perimeter of metal frames on each set of metal units.

### III. PAINTING AND GLAZING

- A. All metal units should be primed with red oxide metal primer or rust inhibitive metal primer prior to glazing or perimeter masonry repairs. Primer should be applied to entire metal surfaces including muntins and glass stops. Allow to dry according to manufacturer's specifications.
- B. Install new glass by double-glazing method:
  - 1. Use Dow-Corning 999 or equivalent silicone against perimeter of glass stop.
  - 2. Install glass and properly seal against silicone.
  - 3. Hand glaze interior perimeter of glass using Dap 33 glazing compound or equivalent.
- C. Allow glazing to skin cure prior to painting.
- D. Application of two coats of rust inhibitive metal enamel to exterior and interior of sash. (Color specified)
- E. Clean glass for removal of paint, glazing oil, ect...

### IV. HARDWARE

- A. All designated operable units should be left in good working condition. All movable parts should be oiled and cleared of debris and binding paint. Hopper latch arms should be straightened and in good working order.
- B. Fixed units should be sealed using silicone caulking.



# R. A. Corapi Co.

February 26, 1990

Mr. John H. Myers  
Director  
Center of Architectural conservation  
Georgia Institute of Technology  
Atlanta, Georgia 30332-0155

Re: Veteran's Administration Medical Center  
Waco, Texas

Dear Mr. Myers:

Per your letter of January 30, 1990 with regard to the restoration of the steel double hung windows in the Veteran's Administration Medical Center Building in Waco, Texas, it is my pleasure to give any help that is necessary to restore these windows.

Presently I am working on a large project here in Philadelphia. The complex is called Alden Park Apartments. These buildings were built in 1929 through 1934; there are three buildings to the complex and there are over 10,000 steel casement windows which I am contracted to repair over the next two years. When I was asked to bid this project, a scope of work was developed by the architectural firm of John Milner Associates which is responsible for the historic restoration portion of this project. The original scope of work was similar to the one you described in your letter. The estimated cost was \$425.00 per window. This price was well above the budget amount and the owner, Bennett Kaplan, asked if I could develop a new scope of work which would restore the windows and decrease the high cost of maintenance associated with steel windows. The following are our findings and the scope of work we developed.

## Existing Conditions and Deficiencies:

1. The windows were glazed with lead base glazing compound which has hardened over the years, becoming useless as a waterproofing material, and is falling out causing tremendous air infiltration. The putty that did not fall off was adhering to the glass in such a manner that removal was impossible except by breaking the glass.





Mr. John H. Myers  
February 26, 1990  
Page Two

Re: Veteran's Administration Medical Center  
Waco, Texas

2. The locking handles were bent and not closing the windows tightly.
3. The inside surface of the windows had approximately 25 coats of paint which accumulated in areas that caused the windows not to close.
4. Window frames were altered for air conditioning and ventilation of kitchens.
5. No lubrication was performed to the moving parts.
6. The original weatherstripping was painted over so many times that it was unnoticeable.

These six deficiencies must sound familiar? My task was to develop a scope of work that would be cost effective and give the owner a window that will last. The following is our new scope of work.

Exterior:

1. The entire exterior surface is hand scraped with wire brushes and scrapers. All the loose putty is removed. All cracked glass is replaced and bedded in silicone. The windows have one coat of primer applied. Then the windows are glazed with a caulking material that is tinted to the finish color. This material will adhere to the old glazing putty as well as to the steel where the putty has come loose. The problem with using conventional oil base glazing putty is that it will not adhere to the old putty. This will cause material breakdown in a short time. At this time, the window is perimeter caulked. After curing of the caulking, the windows have a finish coat of paint applied.
2. All locking handles are removed and repaired and reinstalled with plated screws.
3. The inside surface of the windows are hand chipped to bare metal; this is the most labor intensified part but it is necessary. One coat of primer, one coat of finish paint is applied. All space between the glass and the frame is caulked. By chipping all the paint, the windows begin to operate properly.
5. All moving parts are lubricated with a 50/50 mixture of motor oil and kerosene; this helps loosen all moving parts. Then an application of a silicone based grease is applied.
6. The original weatherstripping in most cases is cleaned with the scraping of the windows. The weatherstripping that is found unserviceable is replaced with material that is almost exactly the same as the original and is readily available from our sources.

Mr. John H. Myers  
February 26, 1990  
Page Three

Re: Veteran's Administration Medical Center  
Waco, Texas

The finished product is a window that will be serviceable for many years and have a relatively low air infiltration for a window of this type.

The cost for this work is \$125.00 per window for the outside work and repairs and \$100.00 per window for the inside work.

The enclosed photos show before and after conditions of the exterior. Also enclosed is a photo of a window that was repaired after an air conditioning unit was removed.

Please contact me if you need further information. I have enclosed a copy of my contract agreement for consulting that is in effect with the University of Pennsylvania. Since it would not be practical to send my workforce to Waco, I feel that the local trades people could be trained in these techniques which would keep the cost low.

Sincerely,

Robert A. Corapi

/rc

**APPENDIX I**

**LIST OF VENDORS FOR PRODUCTS AND SERVICES**

### VENDOR SHORT LIST

The following companies have shown an interest in the Waco project.

#### RETROFIT COMPANIES

R.A. Corapi Co.	Repair in-place	\$225.00
Leeds Clark Restoration	Remove and repair	\$285.00 to \$335.00
Structural Restoration & Waterproofing Co., Inc.	Remove and repair With second window	\$1745.00 \$2418.00
Landmark Restorations, Inc.		Info to come

NOTE: The following consultants offer their services on the Waco project using local labor. They have substantial experience in rehabilitation in their geographic area, but would not desire to send workmen across the country. They are available to spec out work and train and supervise local craftsmen/workmen from the Waco area. It is not anticipated that they would be needed if any of the above "retrofit" companies are selected.

John Seekircher, Seekircher Window Repair

Maurice Schickler, ABCO Exterior Restoration

#### STEEL WINDOW MANUFACTURERS

Coast to Coast Manufacturing	Double-glazed, projecting	\$1850.00
Optimum Window Mfg. Corp.	Double-glazed, single-hung	\$1800.00
William Bayley Co.	Double-glazed, projecting	Info to come
Rusco Building Prod.	Double-glazed, single-hung	Info to come
Torrance Steel Window Co.		Info to come

#### ALUMINUM WINDOW COMPANIES

Custom Window	Replace sash w/ series 9100	\$963.00
	Replace sash w/ custom	\$1218.00
	Replace sash & frame w/9100	\$1034.00
	Replace sash & frame w/custom	\$1288.00
DeVAC, Inc.		Info to come

\*For company address and phone number, see vendor list following this page.



STEEL WINDOW MANUFACTURERS

COMPANY NAME	PERSON TO CONTACT	ADDRESS	CITY	STATE	ZIP	TELEPHONE
A&S Window Associates, Inc.	Alan Herman	88-19 76th Ave.	Glendale	NY	11385	(718)275-7900
Bayley, William, Co.	I. E. Veidamanis	1200 Warder St. PO Box 1287	Springfield	OH	45501	(513)325-7301
Bliss-Cashier Metal Products	John Cashier	617 W. Manlius St. PO Box 310	East Syracuse	NY	13057	(315)437-3396
Coast to Coast Manufacturing	Elli Schepker	13643 Fifth Street	Chino	CA	91710	(818)964-6451
Hope's Architectural Products	Randall P. Manitta	84 Hopkins Ave.	Jamestown	NY	14701	(716)665-5124
Iowa Concrete Material Co.		1510 Fuller Rd. PO Box 65667	West Des Moines	IA	50265	(515)224-0200
Loyal Industries, Inc.		4613 N. Cooper Place	Tampa	FL	33614	(813)875-2002
Nelson Bros., Inc.		4650 W. 120th	Chicago	IL	60658	(312)568-1126
Optimum Window Manufacturing	Robert Porges	311 Casanova Street	Bronx	NY	10474	(212)991-0700
Palace Windows	Herman Weeldreyer	519 W. First Ave.	Mitchell	SD	57301	(605)996-3282
Pomeroy, Inc.	Rex Cross	PO Box 1377	Stamford	CT	06904	(203)324-6775
Post Road Iron Works, Inc.	Wayne Palmer	345 W. Putnam Ave.	Greenwich	CT	06830	(203)869-6322
Rolite-MSW Mfg. Co.		PO Box 311	Lancaster	NY	14086	(716)683-0259
Rusco Building Systems, Inc.	Herb Morehead	4601 8th Ave.	Marion	IA	52302	(319)373-1056
Southern Steel Co.	Don Bierstedt	PO Box 2021	San Antonio	TX	78297	(512)533-1231
Torrance Steel Window Co./SGF	Louise McAfee	PO Box 4116	Atlanta	GA	30302	(404)659-8383

ALUMINUM WINDOW MANUFACTURERS

COMPANY NAME	PERSON TO CONTACT	ADDRESS	CITY	STATE	ZIP	TELEPHONE
Consolidated American Window Custom Window	Alan Brown	Little Rock Hwy. PO Box 118	Malvern	AR	72104	(501)332-3621
DeVAC, Inc.	Frank Hetman	10130 State Hwy. 55	Englewood	CO	80151	(800)255-1820
EFCO Corporation		PO Box 609	Minneapolis	MN	55441	(800)328-5717
Graham Arch. Products Corp.		1551 Mt. Rose Ave. PO Box 1104	Monett	MO	65708	(800)221-4169
Jordan Architectural Products	Horace Roberts	24 Frisco Ave. PO Box 14606	York	PA	17405	(717)848-3755
Miami Wall Systems		701 W. 25th Street	Memphis	TN	38114	(800)888-6848
Se-Go Industries, Inc.		5100 NW 72nd Ave.	Hialeah	FL	33010	(305)888-2300
Season-all Windows and Doors	Scoop Rivers	One Parkway Center, Studio 225	Miami	FL	33166	(305)591-8990
Sturdi-Vent	Frank Sullivan	14 Bennett Street	Pittsburgh	PA	15220	(412)922-9936
Traco	D'Earcy P. Davis	Cranberry Indust. Park PO 805	Lynn	MA	01905	(617)596-0250
United States Window Corp.		254 Brighton Ave.	Warrendale	PA	15905	(412)776-7000
Victor Sun Control, Inc.		"G" & Lycoming Sts.	Allston	MA	02134	(617)254-1500
Wausau Metals Corp.	Fred Schoenfeldt	1415 West Street PO Box 1104	Philadelphia	PA	19124	(215)743-0800
Western Metal Sash Co.		534 143rd Street	Wausau	WI	54401	(715)845-2161
			San Leandro	CA	94578	(415)357-4221

RETROFIT COMPANIES/CONTRACTORS

COMPANY NAME	PERSON TO CONTACT	ADDRESS	CITY	STATE	ZIP	TELEPHONE
ABCO Exterior Restoration	Maurice Schickler	318 East 70th Street	New York	NY	10021	(212)288-5700
Architectural Systems	Gary Graf	712 Broadway, Suite 202	Kansas City	KS	64105	(816)471-0333
B.J. Service Co.	William Burroughs	PO Box 129	Pearland	TX	77588	(713)485-5533
R.A. Corapi Company	Bob Corapi	2307 Oakdale Ave.	Glenside	PA	19038	(215)887-0556
Discount Window Repair Service	Sam Frastici	14650 Southlawn Ln, Bay 12	Rockville	MD	20850	(301)424-9155
Landmark Restorations, Ltd.	Frank Thomas	645 Antone St. NW	Atlanta	GA	30318	(404)352-1795
Leeds Clark Restoration	Tom Clark	300 North Third St. PO Box 222	Midlothian	TX	76065	(214)775-3843
McNatt, William L., & Co.	Bill McNatt	217 East Sheridan St.	Oklahoma City	OK	73104	(405)232-7245
Schlegel Retrofit	Bob Carman	1555 Jefferson Rd. PO 23197	Rochester	NY	14692	(716)427-7200
Seekircher Window Repair	John Seekircher	630 Saw Mill River Rd.	Ardsley	NY	10502	(914)693-1920
Stivale, William	William Stivale	47 West 71st Street	New York	NY	10023	(212)595-4837
Structural Restoration & Water	Patrick W. Cotter	PO Box 79014	Houston	TX	77279	(713)464-9961
Tellespen Corporation	David Hill	15600 W. Hardy Road	Houston	TX	77060	(713)820-9491
Western Waterproofing Co.	Eric Neuman	5728 Clarewood	Houston	TX	77081	(713)667-6682
Western Waterproofing Co.	Dennis Williams	7708 Sovereign Row	Dallas	TX	75247	(214)263-4257

**APPENDIX J**

**TAPE BALANCE DESCRIPTION AND SOURCES**

**(DESCRIPTION FROM OLD HOUSE JOURNAL - SEPT/OCT 1989)**

## Tape Balances

Spring-loaded balances are the alternative mechanical system to weights and pulleys. Many patented

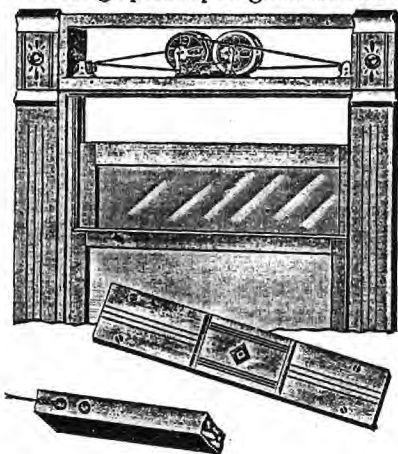


**A Perfect Substitute for Weights and Cords.**  
**ORMSBY SASH HOLDER CO.**

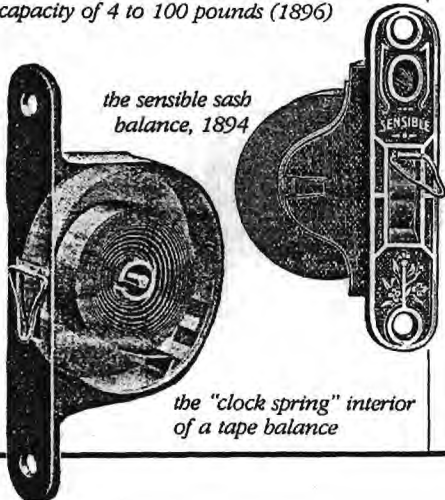
*roller spring balance, 1886*

designs were marketed in the 19th century, intended to simplify the construction of twin and triple windows by eliminating the weight box. Most have gone the way of the buffalo. Today, the two most popular spring devices are relatively new. (Tube balances appeared in the late 1930s; block-and-tackle, in the 1960s.) Only tape balances have a considerable history in old houses and are still available today.

The tape balance (also known as a clockspring balance) has been in use for nearly 100 years. Essentially, it is a long spiral spring enclosed in



*the security balance claimed a capacity of 4 to 100 pounds (1896)*



*the sensible sash balance, 1894*

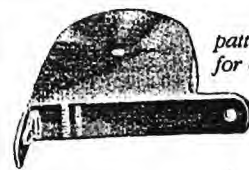
*the "clock spring" interior of a tape balance*

a drum, onto which a steel tape is wound. The whole assembly is housed in a case similar to (and installed like) a sash pulley. The window sash is suspended by the tapes, which are terminated in a small bail that catches a hook mounted on the sash stile. In many installations, this arrangement allows for disconnecting the tape and changing the balance without removing stops or sash from the window frame.

For decades, manufacturers have pointed out that tape balances are more versatile than a weights-and-pulleys system. They conserve space on either side of the window frame — especially when they are staggered — and so make narrow mullions possible in twin- and triple-window construction. As with pulleys, overhead models are made for installations where the pulley stile has no room for hardware. But tape balances have certain drawbacks.

Sash weight is critical: Sash frames and glass have to be weighed — not estimated — for proper mating with balances which are manufactured in many different sizes and spring tensions (and often made-to-order). Most stock balances have a maximum limit of about 45 pounds when used in pairs; some special-order, heavy-duty units are capable of counterbalancing 100-pound sash.

It pays to "over-spec" the tape-balance size, if there's any question about the right unit for a sash. Undersize or marginal balances are working at their limit and tend to fail prematurely. Maximum balance

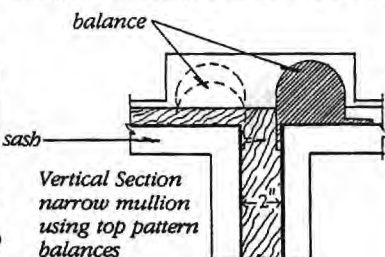


*pattern tape balance for overhead use*

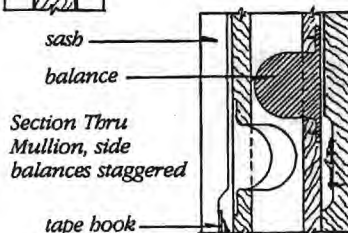
life comes when the mechanism performs a certain percentage *under* its capacity.

Tape balances break, too, and putting them back into service is usually more expensive than with pulley systems. The balance springs are under tremendous tension and are not user-serviceable. There are only two options for repair: complete replacement with a new unit, or rebuilding by the manufacturer. (Not all manufacturers offer this service and not all models are rebuildable.)

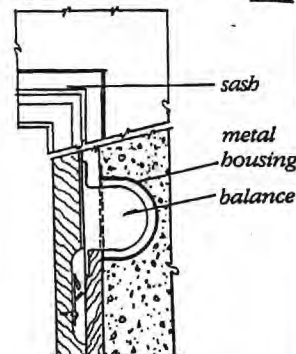
In recent years, tape balances have come back into use for two reasons. First, they are a solution for those people determined to dispose of window-pocket weights so they can fill the cavity with insulation. (Caulking the weight pocket and the exterior window casing, however, usually saves as much energy.) Second, tape balances are a usable alternative to weights and pulleys for retrofits in historic buildings where hardware for the original system is either unavailable or impractical. Although not identical, tape balances are far closer in appearance to sash cord and pulleys than are contemporary spring balances, and they don't require remilling the sash stiles or other extensive changes to original design.



*Vertical Section narrow mullion using top pattern balances*



*Section Thru Mullion, side balances staggered*



*Vertical Section showing metal housing for sash balances used with concrete construction*



## BALANCE - PARTS SUPPLIERS

### **Anderson Pulley Seals, Inc.**

920 West 53rd St., Dept. OHJ  
Minneapolis, MN 55419  
(612) 827-1117

*pulley seals that cut down on drafts  
around the pulley*

### **Architectural Iron Co.**

Box 126, Schocopee Rd., Dept. OHJ  
Milford, PA 18337  
(717) 296-7722

*sash weights, stacking design*

### **Barry Supply Company**

36 West 17th St., Dept. OHJ  
New York, NY 10011  
(212) 242-5200

*pulleys, sash weights in some sizes; old-  
hardware specialists*

### **Blaine Window Hardware, Inc.**

1919 Blaine Drive, R.D. 4, Dept. OHJ  
Hagerstown, MD 21740  
(800) 678-1919; (301) 797-6500

*pulleys, spring balances, extensive mod-*

*ern hardware*

### **Caldwell Manufacturing Co.**

P.O. Box 92891, Dept. OHJ  
Rochester, NY 14692-8991  
(716) 352-3790

*tape-balance manufacturer*

### **Castings Unlimited**

P.O. Box 400, Dept. OHJ  
Morris, NY 13808  
(607) 263-5194

*manufactures sash weights; must have  
pattern or sample — send sample for  
quote*

### **Hern Iron Works**

1900 Millview, Dept. OHJ  
Coeur D'Alene, ID 83814  
(208) 765-3115

*sash weights; has patterns for most sizes,  
requires minimum order*

### **Pullman Manufacturing Co.**

77 Commerce Drive, Dept. OHJ

Rochester, NY 14623

(716) 334-1350

*tape-balance manufacturers*

### **Quaker City Manufacturing Co.**

701 Chester Pike, Dept. OHJ  
Sharon Hill, PA 19079  
(215) 586-4770

*sash lubricants, vinyl channel*

### **Stry-Buc Inc.**

546 Church Lane, Dept. OHJ  
Yeadon, PA 19050  
(800) 352-0800; (215) 626-3200

*tape balances, extensive modern  
hardware*

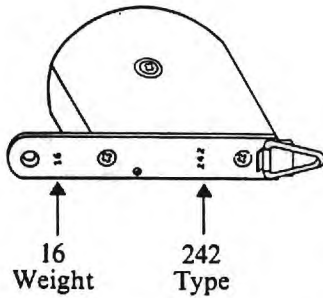
### **The Woodstone Company**

P.O. Box 223, Patch Road, Dept. OHJ  
Westminster, VT 05158  
(802) 722-3544

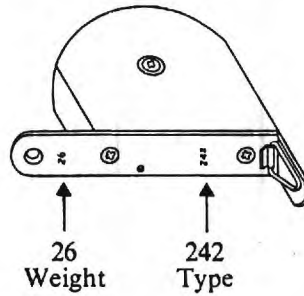
*sash manufacturer; will sell pulleys,  
some sizes*

## SASH SUPPORT SYSTEMS

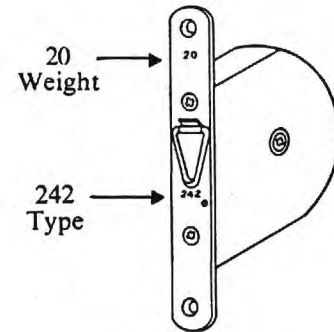
### TAPE BALANCES



OVERHEAD STYLE - FT



OVERHEAD STYLE - AT



SIDE STYLE - S

	TYPE 242	TYPE 150	TYPE 154
LBS	PART #	PART #	PART #
4	96-1	-	-
6	96-2	96-37	-
8	96-3	96-38	-
10	96-4	96-39	-
12	96-5	96-40	-
14	96-6	96-41	-
16	96-7	96-42	-
18	96-8	96-43	-
20	96-9	96-44	96-73
22	96-10	96-45	96-74
24	96-11	-	96-75
26	96-12	96-46	96-76
28	-	96-47	96-77
30	-	-	96-78
32	-	96-48	96-79
34	-	-	96-80
36	-	-	96-81
38	-	-	96-82
40	-	-	96-83

	TYPE 242	TYPE 150	TYPE 154
LBS	PART #	PART #	PART #
4	96-13	-	-
6	96-14	96-49	-
8	96-15	96-50	-
10	96-16	96-51	-
12	96-17	96-52	-
14	96-18	96-53	-
16	96-19	96-54	-
18	96-20	96-55	-
20	96-21	96-56	96-84
22	96-22	96-57	96-85
24	96-23	-	96-86
26	96-24	96-58	96-87
28	-	96-59	96-88
30	-	-	96-89
32	-	96-60	96-90
34	-	-	96-91
36	-	-	96-92
38	-	-	96-93
40	-	-	96-94

	TYPE 242	TYPE 150	TYPE 154
LBS	PART #	PART #	PART #
4	96-25	-	-
6	96-26	96-61	-
8	96-27	96-62	-
10	96-28	96-63	-
12	96-29	96-64	-
14	96-30	96-65	-
16	96-31	96-66	-
18	96-32	96-67	-
20	96-33	96-68	96-95
22	96-34	96-69	96-96
24	96-35	-	96-97
26	96-36	96-70	96-98
28	-	96-71	96-99
30	-	-	96-100
32	-	96-72	96-101
34	-	-	96-102
36	-	-	96-103
38	-	-	96-104
40	-	-	96-105

### How To Order:

1. Identify Style FT - AT - S
2. Identify Type - 242 - 150 - 154 (Type # will be stamped on face plate)
3. Weight (Number will be stamped on face plate)
4. Find our Part Number in appropriate table above!

Type 242 For maximum sash weight 26 lbs., Tape length 39"

Type 150 For maximum sash weight 35 lbs., Tape length 50"

Type 154 For maximum sash weight 50 lbs., Tape length 50"

\* Special tape lengths are available - Must Special Order.

\* Heavier duty tapes are available - Must Special Order by Sample.

**APPENDIX K**  
**STEEL WINDOW CHARACTERISTICS**

## **STEEL WINDOWS MAKE BETTER BUILDINGS THE REASONS MAKE GOOD SENSE**

### **ENERGY CONSERVATION**

Windows are extremely sensitive to energy transfer and therefore have a significant effect on the overall thermal performance of modern buildings.

This performance is effected by the ratio of glass area to window frame area, type of glass, fenestration and window construction. Test results have proven the resistance of steel windows is five times greater than its aluminum counter part.

Heat loss resistance of a steel window is enhanced through the section profiles which, due to their strength have been designed smaller than aluminum shapes for identical windload conditions.

Tested weatherstripped steel windows offer very low air infiltration readings and the added strength of steel helps maintain a good seal through many years of use.

### **STRENGTH & AESTHETICS**

Steel windows are 3 times stronger than their aluminum counterparts. Buildings designed and constructed, or retrofited with steel windows benefit from increased structural integrity. That's obvious. But other advantages, both practical and aesthetic, also derive from steel strength — and are often overlooked.

- Steel windows accommodate large glass lites without massive members.
- Building sight lines are greatly reduced, extending creative approaches to building design.
- Thermal expansion is minimal (half that of aluminum), eliminating problems such as sheared sealants and inoperable vents.
- Steel windows are vandal resistant.

### **DURABILITY**

Steel windows provide excellent life cycle. Under the most severe conditions, racking, bending and gouging are unlikely, and operating hardware has little susceptibility to damage. Manufacturers are utilizing finishing technology such as bonderizing, galvanizing, rust-inhibitive post-assembly priming and specially formulated factory applied coatings to assure products that stay good looking and take the punishment for years.

### **VALUE**

No matter what type of window application is called for, no window alternative can deliver the clearly demonstrated long-term advantages and economy of steel windows. In strict design/materials/manufacturing terms, the first costs of metal windows are roughly equivalent. When building design flexibility, strength and performance are considered together with steel window contributions to building life cycle — cost comparisons are a different matter. Steel windows are economical windows.

**APPENDIX L**  
**SELECTED BIBLIOGRAPHY**



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